STEVEN A. THOMPSON
Executive Director

OKLAHOMA DEPARTMENT OF ENVIRONMENTAL QUALITY

BRAD HENRY
Governor

March 30, 2004

Richard E. Greene
Regional Administrator
USEPA Region VI
1445 Ross Avenue, Suite 1200
Dallas, TX 75202-2733

Dear Mr. Greene:

I am pleased to enclose the Clean Air Action Plan (CAAP) for both the Central Oklahoma and Tulsa Early Action Compacts (EAC). This submittal is made in fulfillment of the March 31, 2004 milestone outlined in Jeffrey Homestead's memo of November 14, 2002.

The Air Quality Division of the Oklahoma Department of Environmental Quality (DEQ) will continue to work in close cooperation with the Association of Central Oklahoma Governments (ACOG), the Indian Nations Council of Governments (INCOG), and our modeling contractor, ENVIRON, in further refining and developing these plans with the goal of making final State Implementation Plan (SIP) submittals by the end of this year. The DEQ, ACOG, and INCOG will strive to meet upcoming EAC milestones even though current monitoring data now indicate both Oklahoma City and Tulsa areas are currently in attainment with the 8-hour ozone standard, making non-attainment deferrals unnecessary at this time.

The modeling analyses performed indicate that the Oklahoma City area will continue to attain the standard by 2007, and weight of evidence demonstrations can be used to predict attainment in Tulsa as well. DEQ plans to incorporate the Transportation Control Measures recommended by ACOG and INCOG into our SIP by the December 31, 2004 deadline.

As additional support of the local control strategies described in the CAAP, the Air Quality Division is pursuing likely state-initiated control measures that could be incorporated into the SIP; especially in the event of monitored non-attainment this summer. Such measures could include emission reductions required by consent orders related to ongoing enforcement negotiations.

We look forward to working with your office on these important matters.

Sincerely,

Eddie Terrill
Director, Air Quality Division

ET:ST:jmc

C: Tom Diggs, EPA
Jerry Lasker, INCOG
Zach Taylor, ACOG

Clean Air Action Plan

for the

Central Oklahoma
Early Action Compact

and the

Tulsa Metropolitan Area 8-hour Ozone
Early Action Compact

Prepared by

The Oklahoma Department of Environmental Quality

The Association of Central Oklahoma Governments

The Indian Nations Council of Governments

with the assistance of

ENVIRON Corporation

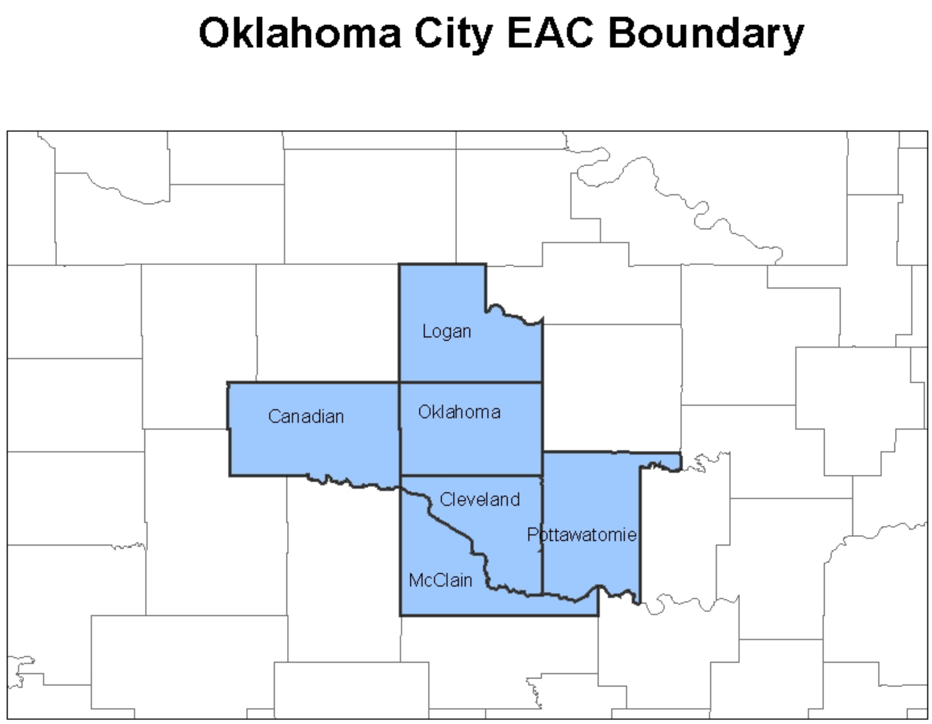
March 30, 2004

Contents

I. Background

Early Action Compacts (EAC) for the Central Oklahoma Air Quality Area and the Tulsa Metropolitan Area were submitted to the U.S. Environmental Protection Agency on December 31, 2002, committing the two regions to early emission reductions toward attainment of the 8-hour ozone standard. The agreements were intended to expedite air cleanup for the future public health and welfare of Oklahomans, and to defer the effective date of any potential nonattainment designations for the 8-hour ozone standard.

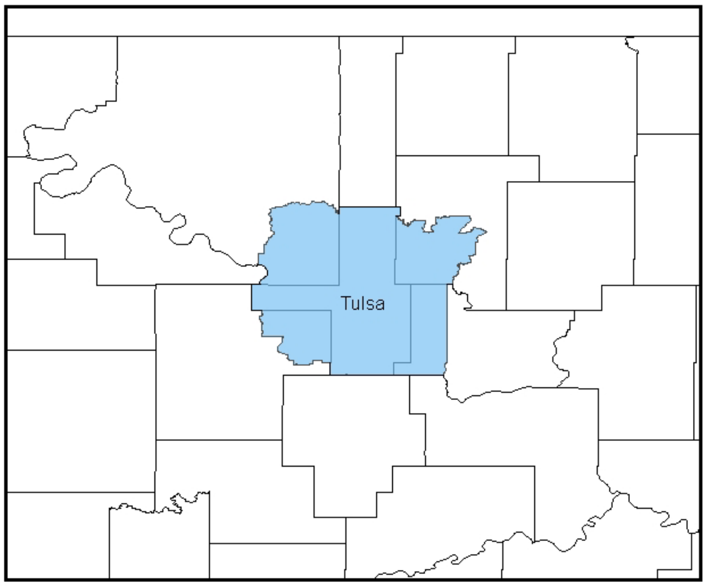
The Central Oklahoma Air Quality Early Action Compact Area represents the Oklahoma City Metropolitan Statistical Area (MSA), as defined by the U.S. Bureau of the Census. Counties affected by this definition include Oklahoma, Canadian, Cleveland, Logan, McClain and Pottawatomie.



The Oklahoma City Metropolitan Statistical Area (MSA) includes Oklahoma, Canadian, Cleveland, McClain, and Pottawatomie Counties.

The Tulsa Metropolitan Early Action Compact Area is represented by the Tulsa Transportation Management Area (TTMA) and includes Tulsa County and portions of Creek, Osage, Rogers and Wagoner Counties.

Tulsa EAC Boundary



The Tulsa Metropolitan Early Action Compact Area (TTMA) is not an MSA. It includes Tulsa County and portions of Creek, Osage, Rogers, and Wagoner Counties.

Signatories to the Central Oklahoma Area EAC are the Chairman of the Association of Central Oklahoma Governments (ACOG) Board of Directors, the Director of Air Quality for the Oklahoma Department of Environmental Quality, the Mayor of the City of Oklahoma City, the President of the Greater Oklahoma City Chamber of Commerce, the Oklahoma Department of Transportation, and the Administrator for EPA Region 6.

Signatories to the Tulsa Metropolitan Area EAC are the Chairman of the Indian Nations Council Of Governments (INCOG) Air Quality Committee, the Chairman of the INCOG Board of Directors, the Director of Air Quality for the Oklahoma Department of Environmental Quality, the Mayor of the City of Tulsa, the Tulsa

County Board of Commissioners, the President of the Metro Tulsa Chamber of Commerce, and the Administrator for EPA Region VI.

In the past, both Tulsa and Oklahoma City areas would have exceeded the 8-hour ozone standard but currently the two areas have 8-hour ozone Design Values in attainment of the standard and state leaders expect EPA to designate the entire state in attainment making non-attainment deferrals unnecessary at this time. Nonetheless, the Early Action Compacts commit these two Oklahoma areas to the basic principals of the EAC Protocol (see Table 3 below):

Basic Principals of the EAC Protocol
• Early emission reductions to attain the 8-hour ozone standard; • Local control, with broad-based public input; • State support to ensure technical integrity of the early action plan; • Early action plan incorporated into the SIP; • Effective date of nonattainment designation and/or designation requirements is deferred (as long as all EAC terms and milestones are met); • Safeguards to return to a traditional SIP requirements if EAC terms and/or milestones are not met.

EAC Protocol Principals.

As administrator, The Department of Environmental Quality recognized Early Action Compacts as an opportunity for Oklahoma to organize state, public, and private sectors into a synchronous effort toward certain attainment of the federal standards for ozone. The Department, in cooperation with ACOG and INCOG, contracted ENVIRON International Corporation (ENVIRON) of Novato, California to develop emissions and photochemical modeling databases upon which emission reductions and attainment demonstrations can be based.

A Technical Advisory Committee of community decision makers provides oversight to the project. A second, smaller executive committee is responsible for the development of policy (See Table 4). Communication and decision making has been accomplished through a series of private and public committee meetings held in both Tulsa and Oklahoma City where, for the most part, consensus has been reached.

TECHNICAL ADVISORY COMMITTEE	
Representing	**Name/Affiliation**
Local Government	Nancy Graham, Indian Nations Council of Governments Gaylon Pinc, INCOG *Alternate*
Local Government	Doug Rex, Association of Central Oklahoma Governments
State Government	Leon Ashford, Department of Environmental Quality Lee Warden, DEQ *Alternate*
Petroleum	Steve Moyer, Sinclair Oil Corporation Glen Travis, Sunoco *Alternate*
General Industry	Gary Collins, Terra Industries Sherri Vanhooser, DRV Energy, Inc. *Alternate*
Federal Government	Erik Snyder, Environmental Protection Agency Region VI
Utilities	Howard Ground, American Electric Power David Branecky, OGE *Alternate*
Transportation	Roger Saunders, ODOT Planning Division
Environmental	unfilled
POLICY GROUP	
State	Eddie Terrill, Director of Air Quality, DEQ
Federal	Thomas H. Diggs, Chief Air Planning, EPA Region VI

Membership of the Technical Advisory Committee and Policy Group.

Key dates for the Compact have been met by both the Central Oklahoma Area and the Tulsa Metropolitan Area. These were December 31, 2002 for submission of their compacts and June 16, 2003 to identify local strategies for each EAC Plan.

Oklahoma Early Action Compacts TAC & Public Meetings		
Public Meeting	11/19/02	OKC
TAC Meeting	12/19/02	Tulsa
TAC Meeting	01/07/03	Tulsa
TAC/Public Meeting	03/05/03	OKC
TAC/Public Meeting	03/13/03	OKC
TAC/Public Meeting	05/22/03	OKC
TAC/Public Meeting	05/27/03	Tulsa
TAC/Public Meeting	10/02/03	Tulsa
TAC/Public Meeting	01/22/04	OKC
TAC Conference Call	03/12/04	*
TAC Public Meeting	03/16/04	Tulsa

* Conference call originated in DEQ Headquarters

Meetings held by/for the EAC decision makers.

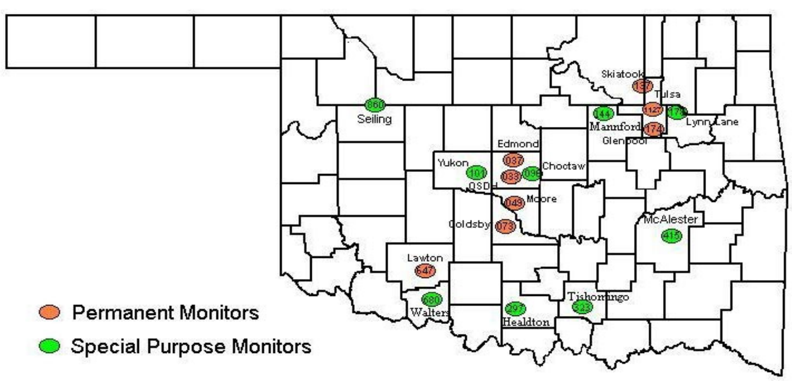
The progression of meetings, presentations, and milestones are tracked on the agency website deq.state.ok.us/aqdnew/whatsnew/sip/eac.htm.

II Monitored 8-hour Ozone Values Show Attainment

In 2003, there were 17 sites operated by the DEQ monitoring ozone in the State of Oklahoma. Three sites were along the Red River (Walters, Healdton, and Tishomingo); five sites in the Tulsa area (Mannford, Tulsa, Skiatook, and Glenpool); six sites in the Oklahoma City vicinity (Edmond, OKC, Moore Goldsby, and Yukon); a site in Eastern Oklahoma (McAlester) and a site in western Oklahoma (Seiling).

The data below shows the relative location of these monitors.

Oklahoma DEQ Ozone Monitoring Network



The chart on the following page depicts a summary of the 8-hour ozone concentrations recorded at these sites during the last four years. Design values of the metropolitan monitors obtained by averaging the fourth highest 8-hour ozone values recorded at each site from 2001-2003 ranged .077 ppm in Lawton to .083 ppm in Skiatook. No sites in the state recorded 2003 design values greater than the standards. Consequently, Governor Henry has recommended that the entire State of Oklahoma be designated as attainment for the 8-hour ozone standard. Because both the areas encompassed by the Tulsa and Oklahoma City areas will be considered attainment, deferral of the effective date of designation will not be necessary this year.

2003 OKLAHOMA OZONE

Highest 8 Hour Averages as 10/2/03

(PPM)

Site			1st	2nd	3rd	4th	00-02 Avg*	01-03 Avg*
00 4th	01 4th	02 4th	(date)	(date)	(date)	(date)	4th Highs	4th Highs
Walters (680)			0.087	0.082	0.078	0.077		
(new)			9-Sep	8-Aug	24-Jul	11-Aug		
Healdton (297)			0.085	0.084	0.083	0.081		
(new)			19-May	9-Sep	17-Sep	8-Aug		
Tishomingo (323)			0.087	0.078	0.075	0.070		
(new)			9-Jun	17-Sep	14-Jul	6-Aug		
Mannford (144)			0.090	0.087	0.083	0.081		
(new)			22-Aug	12-Apr	5-Sep	8-Aug		
Lynn Lane (178)			0.089	0.089	0.089	0.084		
(new)	0.078	0.080	12-Apr	30-May	22-Aug	31-Jul		
Tulsa (1127)			0.094	0.085	0.081	0.080	0.081	0.080
0.083	0.081	0.080	21-Jul	24-Aug	22-Aug	5-Aug		
Skiatook (137)			0.094	0.088	0.085	0.083	0.087	0.083
0.096	0.084	0.083	21-Jul	12-Apr	25-Aug	31-Jul		
Glenpool (174)			0.091	0.088	0.087	0.086	0.080	0.081
0.081	0.077	0.082	19-Jun	29-Jul	22-Aug	23-Aug		
Edmond (037)			0.088	0.082	0.082	0.082	0.082	0.080
0.086	0.082	0.078	7-Aug	9-Jun	31-Jul	24-Aug		
OKC (033)			0.093	0.082	0.080	0.080	0.079	0.079
0.080	0.078	0.080	7-Aug	31-Jul	8-Aug	10-Aug		
Moore (049)			0.086	0.082	0.077	0.076	0.077	0.076
0.079	0.079	0.075	29-Jul	30-May	6-Aug	24-Aug		
Goldsby (073)			0.086	0.082	0.080	0.077	0.079	0.078
0.081	0.080	0.078	29-Jul	5-Aug	6-Aug	31-Jul		
Choctaw (096)			0.085	0.082	0.079	0.078		
(new)	0.063	0.078	7-Aug	9-Jun	24-Aug	30-May		
Yukon (101)			0.081	0.079	0.078	0.078		
(new)	0.058	0.081	9-Aug	8-Aug	19-Jun	7-Aug		
Lawton (647)			0.086	0.080	0.080	0.078	0.079	0.077
0.085	0.078	0.076	9-Sep	8-Aug	11-Aug	6-Aug		
McAlester (415)			0.079	0.079	0.076	0.076		
(new)	(new)	0.076	12-Apr	24-Aug	11-Apr	27-Apr		
Seiling (860)			0.079	0.078	0.077	0.077		
(new)	(new)	0.069	9-Sep	7-Aug	31-Jul	8-Aug		

*0.085 or greater indicates exceedance of the proposed NAAQS
** Site closed 7/5/00

III Attainment Demonstration Modeling

Model Selection

Excerpts of the modeling report provided by ENVIRON are reproduced here to provide a description of the modeling performed, control scenarios examined, and weight of evidence analyses conducted by the contractor in support of the EAC agreements for Tulsa and Oklahoma City. The following excerpt addresses the models selected and sources of data used in the analyses.

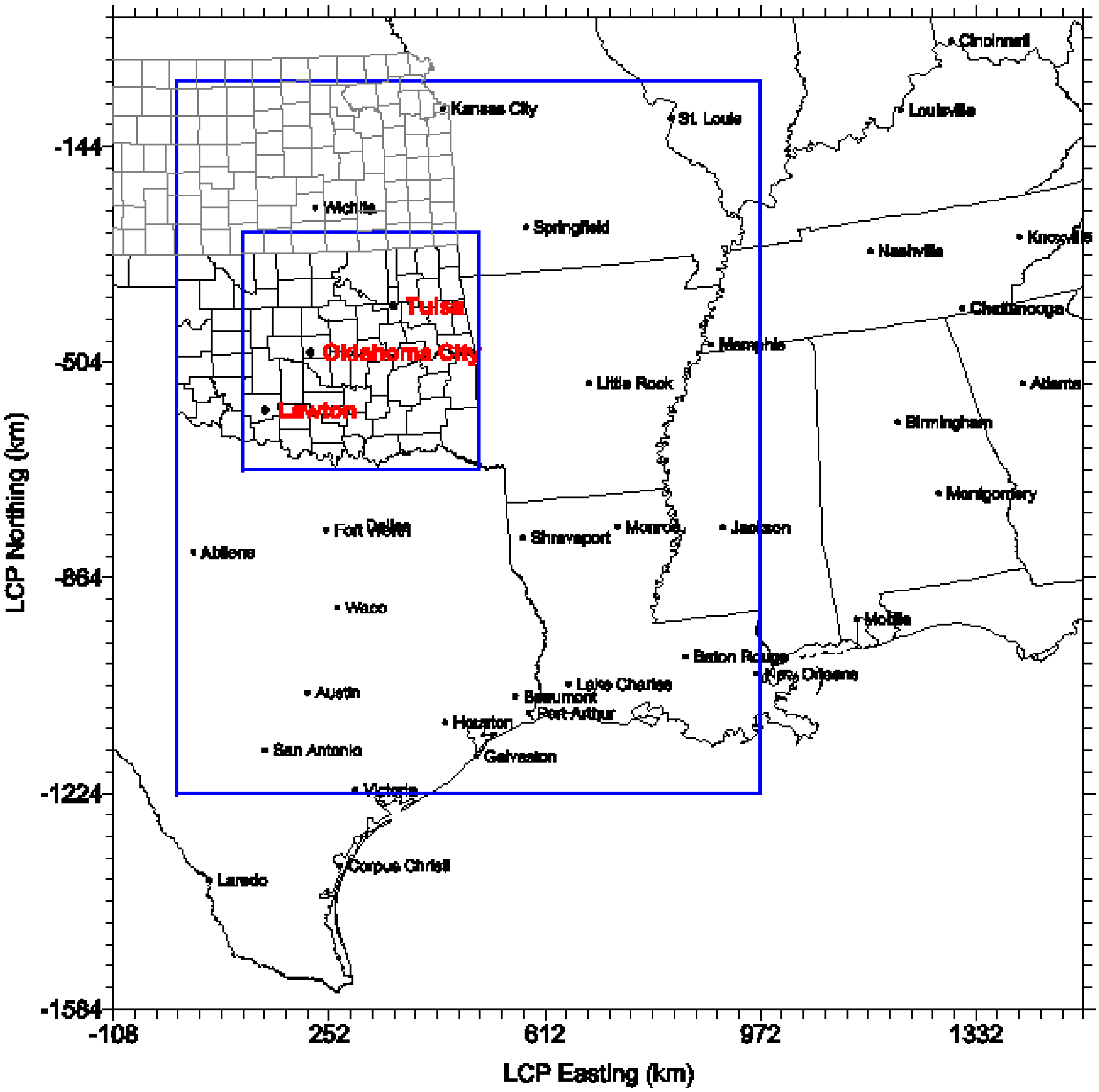
> Photochemical modeling was performed for Tulsa and Oklahoma City to evaluate alternative emissions control strategies and demonstrate attainment of the 8-hour ozone standard as part of the Oklahoma Early Action Compact (EAC). A photochemical modeling system consisting of the Version 5 of the Mesoscale Model (MM5), a nonhydrostatic prognostic meteorological model, Version 2x of the Emissions Processing System (EPS2x) and the Comprehensive Air-quality Model with extensions (CAMx) photochemical grid model was applied to a 20-day episode period of August 13 through September 1, 1999 during which elevated 8-hour ozone concentrations occurred in the Tulsa and Oklahoma City areas. The modeling system used a 36/12/4 km grid with the 36 km grid covering the Central States and the 4 km grid focused on Oklahoma (see Figure ES-1). The model was first exercised for a 1999 Base Case simulation and a model performance evaluation conducted to assess the accuracy of the model. The model was then exercised for 2002 and 2007 Base Case emission scenarios and several 2007 emission control strategies to assess attainment of the 8-hour ozone standard. The procedures used to apply the model followed EPA's guidance (EPA, 1991; 1999) and were documented in a Modeling Protocol that was developed at the outset of the Oklahoma EAC modeling process (ENVIRON, 2002).
>
> The MM5 simulation of the August 1999 episode was evaluated against observed surface and upper-air winds, temperature and humidity measurements using the routine monitoring network and the enhanced Oklahoma MESONET network. The MM5 model performance achieved model performance benchmarks on most days and was judged suitable for use in emissions and photochemical modeling (Jia and Morris, 2003a,b).
>
> Emissions were generated for the 1999 Base Case simulation using EPS2x and the MM5 temperature estimates for the August 1999 episode. For states other than Texas, the 1999 National Emissions Inventory Version 3 (99NEI ver3) was the starting point for the area and point source emissions. The Texas Commission on Environmental Quality (TCEQ) provided 1999 emissions for the state of Texas. Day-specific NOx emissions for Electrical Generating Units (EGUs) in Oklahoma and Texas were prescribed using Continuous Emissions Monitoring (CEM) data from

> EPA's Acid Rain Database (ARD). On-road and off-road mobile source emissions were generated using EPA's MOBILE6 and NONROAD models, respectively. Link-based Vehicle Miles Traveled (VMT) data from local Traffic Demand Model (TDM) outputs were used in the Tulsa and Oklahoma City Transportation Management Areas (TMAs), whereas on-road mobile source emissions for Texas were generated by the Texas Transportation Institute (TTI). For the rest of the Oklahoma counties and states other than Texas, county-level Highway Performance Monitoring System (HPMS) VMT data along with MOBILE6 were used to generate the on-road mobile source emissions. Biogenic emissions were generated using the GLOBEIS model and day-specific temperatures from MM5. **(ENVIRON, 2004)**

Model Performance

The following excerpt from the modeling report provided by ENVIRON addresses model performance, referencing EPA guidance documents for both 1-hour and 8-hour ozone attainment demonstrations.

> The CAMx photochemical grid model was exercised for the August 13 through September 1, 1999 period for the 1999 Base Case emissions scenario using the MM5 meteorological fields and the resultant ozone estimates compared against available observations in a model performance evaluation. EPA guidance contains specific performance goals that photochemical models should mostly achieve before being used for projecting ozone attainment (EPA, 1991; 1999). The CAMx photochemical model achieved EPA's ozone model performance goals on most days of the August 1999 episode (Morris, Tai and Jia, 2003a,b). One of the most important EPA model performance goals is to predict the observed daily maximum 8-hour ozone concentration near the monitor at most monitors to within ±20% (EPA, 1999). This goal is important because the maximum predicted daily maximum 8-hour ozone concentration near the monitors are what are used in the modeled ozone attainment demonstration test. Figure ES-2 displays a comparison of predicted and observed daily maximum 8-hour ozone concentrations using the maximum (Figure ES-2a) and nearest (Figure ES-2b) predicted value near the monitor. For the August 1999 episode, the maximum and nearest predicted daily maximum 8-hour ozone concentration near the monitor matched the observed daily maximum 8-hour ozone concentrations to within ±20%, respectively, 84% and 96% of the monitor/days in the Oklahoma 4 km modeling domain thereby satisfying EPA's performance goal that predicted and observed 8-hour ozone pairs be within ±20% at most monitors.



CAMx Grid Dimensions

LCP Grid with reference origin at (40 N, 100 W)

36 km Grid: 45 x 46 cells from (-108, -1584) to (1512, 72)
12 km Grid: 84 x 99 cells from (0, -1224) to (972, -36)
4 km Grid: 99 x 99 cells from (108, -684) to (504, -288)

(nested grid dimensions do not include buffer cells)

Figure ES-1. CAMx 36/12/4-km nested grids for Oklahoma 8-hour ozone EAC modeling.

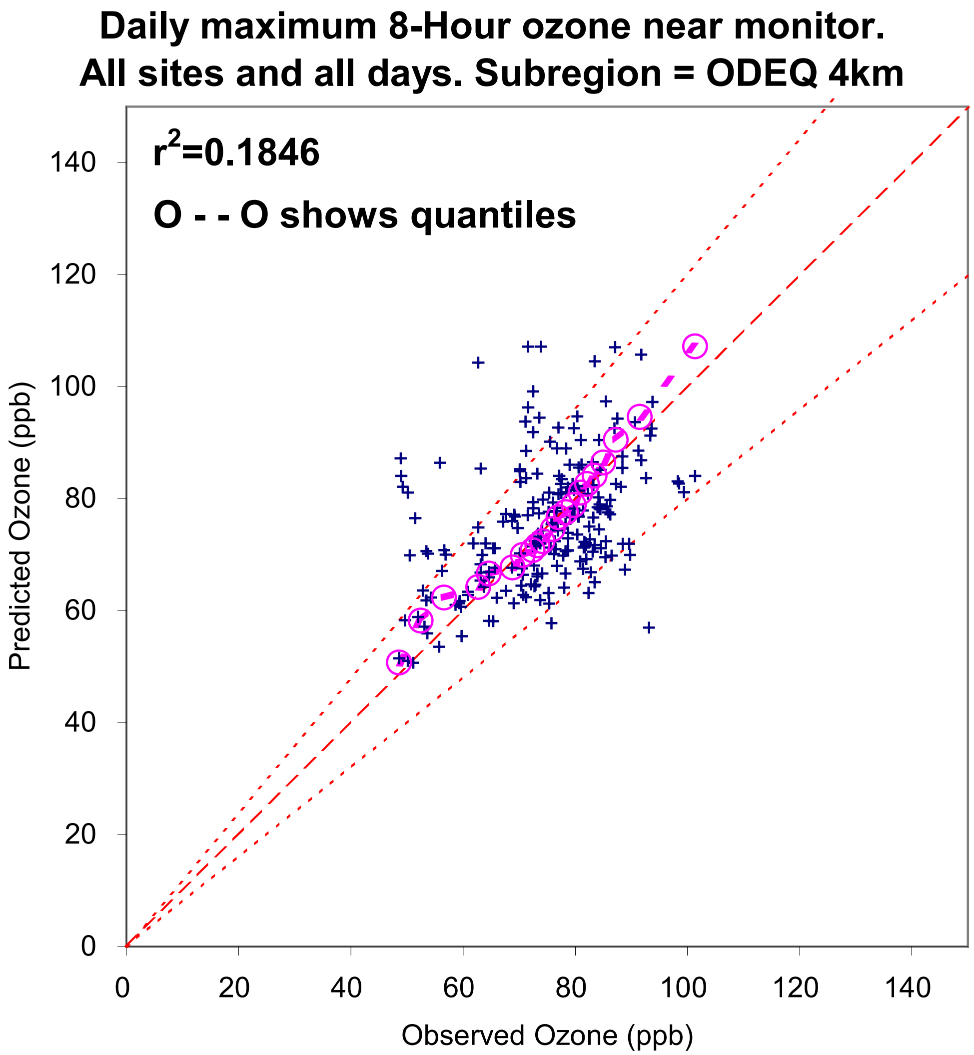


Figure ES-2a. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Oklahoma 4 km domain using the maximum estimated value near the monitor (± 20% indicated by dotted lines).

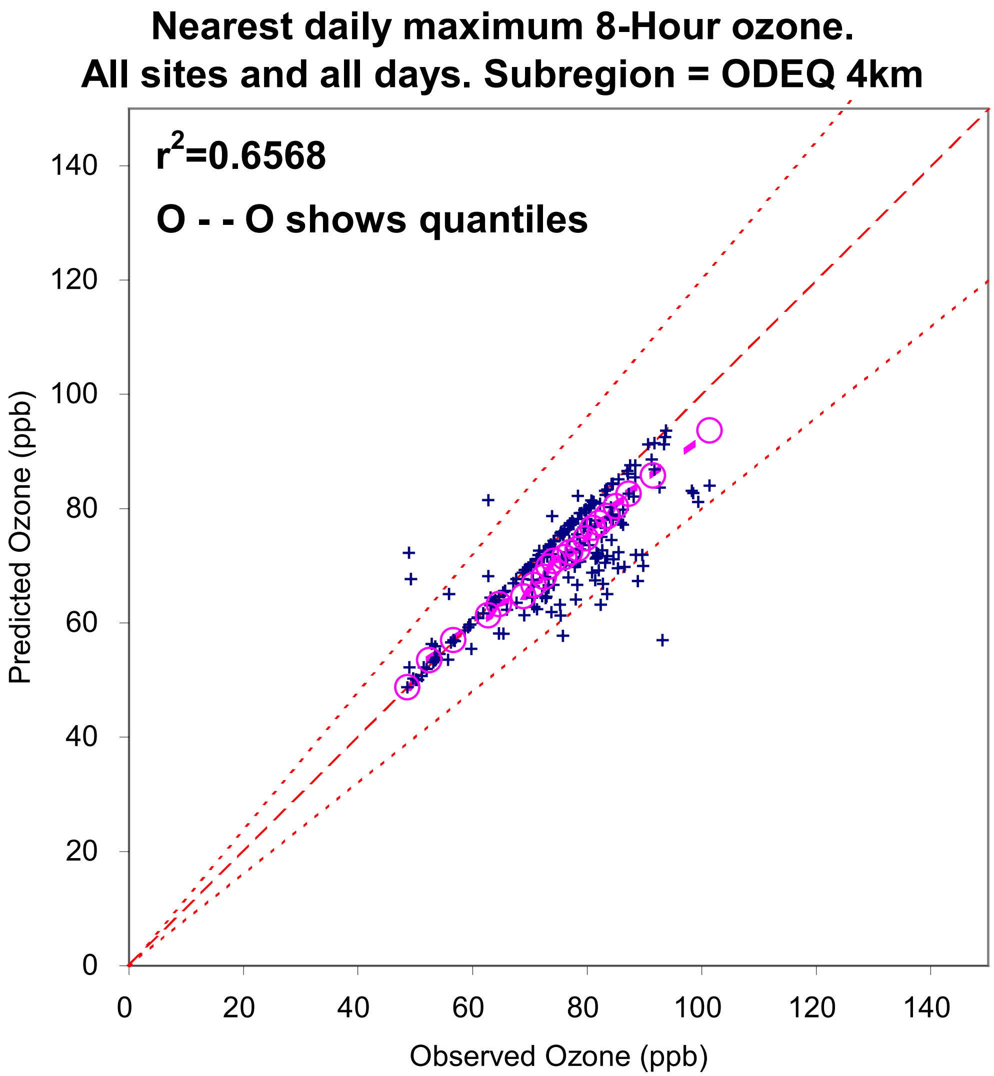


Figure ES-2b. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Oklahoma 4 km domain using the nearest estimated value near the monitor (± 20% indicated by dotted lines). (ENVIRON, 2004)

Future Year Modeling

The following excerpt from the modeling report provided by ENVIRON addresses future year modeling, relative reduction factors and projected 8-hour ozone design values for the 2007 attainment year.

2002 and 2007 Base Case Emission Scenarios

Emissions inputs were developed for a 2002 and a 2007 Base Case emissions scenario. Link-based VMT data for Tulsa and Oklahoma City were interpolated to the 2002 and 2007 years and MOBILE6 was used to generate on-road mobile source emissions. On-road mobile source emissions for Texas and 2002 and 2007 were provided by TTI. Outside of Texas and the two urban areas in Oklahoma, on-road mobile source emissions for 2002 and 2007 were based on EPA's Tier 2 analysis for the Tier 2/Low Sulfur Rule and the MOBILE6 model. Off-road mobile source emissions for 2002 and 2007 for states other than Texas were generated using EPA's NONROAD model, whereas the TCEQ generated the data for Texas. 2002 emissions for Electrical Generating Units (EGUs) were based on the average 3rd quarter of 2002 observed NOx emissions from EPA's Acid Rain Database (ARD). The EGU point source emissions for 2007 were based on EPA's projections used in their Heavy Duty Diesel Rule (HDDR). Outside of Texas, Non-EGU point sources for 2002 and 2007 were projected from the 1999 NEI, augmented with the State of Oklahoma providing specific new point sources from their permit database. TCEQ provided the non-EGU point sources for the 2002 and 2007 Base Case emission scenarios. Area sources were projected from the 1999 NEI inventory using projection factors from version 4.0 of the Economic Growth Analysis System (EGAS).

Procedures for Projecting Future Year 8-Hour Ozone Attainment

The EPA draft guidance for 8-hour ozone modeling has 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). EPA's procedures for projecting future-year 8-hour ozone Design Values starts with a current observed 8-hour ozone Design Value. 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 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 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 case of the Oklahoma application (EPA, 1999).

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 'non-attainment'. 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 and 2002. 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) suggest that 2001-2003 observed Design Values should be used in the Oklahoma future-year Design Value projections. However, EPA Region VI has noted that one interpretation of criteria (a) "most recent available inventory" refers to the latest available version of the National Emissions Inventory (NEI) that is currently the 1999 NEI version 3, which implies that the observed 1998-2000 Design Values should be used. As further interpretation of EPA's 8-hour ozone modeling guidance on this issue we examined the recently published EPA's "Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (Interstate Air Quality Rule); Proposed Rule" (Federal Register, 2004). In the IAQR EPA projected the 1996 NET inventory to generate a 2001 Base Case emissions and then interpreted criteria (a) as implying that 2000-2002 8-hour ozone Design Values should be used in the Design Value projections based on having a 2001 Base Case emissions scenario available. This is almost exactly the same situation as faced by the Oklahoma EAC, only Oklahoma has a 2002 Base Case emissions inventory. To resolve the conflicting guidance from the EPA 8-hour modeling guidance (EPA, 1999), IAQR analysis (EPA, 2004) and statements from Region VI, we will calculated projected 2007 8-hour ozone Design Values using both the 1998-2000 and 2001-2003 observed Design Values. Note that for projecting 2007 Design Values using the 1998-2000 and 2001-2003 observed Design Values, current year base case simulations for 1999 and 2002, respectively, will be used.

2007 Projected 8-Hour Ozone Design Values in Oklahoma

The projected future-year 8-hour ozone Design Values (DVs) in Oklahoma for the 2007 Base Case emissions scenario using the observed 2001-2003 and 1998-2000 8-hour ozone DVs are shown in Table ES-1. The modeled attainment test is passed when the projected future-year 8-hour ozone DV is 84.9 ppb or lower. Using the 2001-2003 observed 8-hour ozone Design Values, all monitors in Oklahoma are modeled as attaining the 8-hour ozone standard with a maximum projected 8-hour ozone DV for the 2007 Base Case in Oklahoma of 80.0 ppb that occurs at the Skiatook monitor in Tulsa. However, using the observed 1998-2000 8-hour ozone Design Values the projected future-year 8-hour ozone DVs at the Tulsa (85.2 ppb) and Skiatook (87.5 ppb) monitors both exceed 85 ppb so do not pass the modeled attainment test. Thus, the modeled attainment test is inconclusive. Under these types of conditions where the modeled attainment test is close to the 8-hour ozone standard EPA guidance recommends that corroborative analysis be conducted and has procedures for conducting a Weight of Evidence (WOE) attainment demonstration. **(ENVIRON, 2004)**

Table ES-1. Projection of future-year 8-hour ozone Design Values in Tulsa, Oklahoma City and Lawton for the 2007 Base Case simulation using: (a) 2002/2007 modeling results and observed 2001-2003 Design Values; and (b) 1999/2007 modeling results and observed 1998-2000 Design Values. **(ENVIRON, 2004)**

Sites	Tulsa	Skiatook	Glenpool	OSDH	Moore	Goldsby	Lawton
(a) 2007 Design Value Projections using observed 2001-2003 8-Hour DVs							
2001-2003 DVs	***80***	***83***	***81***	***79***	***76***	***78***	***77***
2007 Base DV	**77.7**	**80.0**	**78.5**	**76.7**	**73.8**	**75.9**	**74.7**
(b) 2007 Design Value Projections using observed 1998-2000 8-Hour DVs							
1998-2000 DVs	***89***	***93***	***82***	***84***	***84***	***83***	***84***
2007 Base DV	**85.2**	**87.5**	**77.8**	**80.2**	**80.2**	**79.2**	**79.5**

2007 Emission Reduction Sensitivities

While the State continues to be in compliance with the 8-hour ozone standard, INCOG, ACOG, and DEQ developed emission reduction strategies for the Tulsa and Oklahoma City EAC areas in support of the EAC agreements. Several different strategies were evaluated for effectiveness and practicality of adoption and implementation. The following strategies were provided to ENVIRON and analyzed within the model to assess their effectiveness in reducing ground level 8-hour ozone concentrations. The first control strategy was modeled to evaluate the sensitivity of the model.

- 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 (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;
- Traffic Control Measures (TCMs) in the OKC Transportation Management Area (TMA);
- 7.8 psi RVP gasoline in Tulsa TMA (TTMA) with 85% market penetration.
- Intelligent Traffic Systems (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 Burner 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
- Basic Inspection and Maintenance (I/M) in Tulsa MSA.

The following excerpt addresses the sensitivity modeling conducted by ENVIRON and provides the projected 8-hour ozone design values for the primary monitors of concern in the Tulsa and Oklahoma City metropolitan areas. These projected design values provide an estimate of the reduction achieved by the strategies modeled.

> The local transportation agencies in OKC (ACOG) and Tulsa (INCOG) have provided new link-based mobile source activity data for, respectively, Oklahoma City and Tulsa for the OKC TCMs and ITS/Transportation Congestion Mitigation control strategies. These control strategies are still being modified and the results are not yet available.
>
> Using the 2001-2003 observed 8-hour ozone Design Values (DVs) attainment is demonstrated at all Oklahoma monitors for the 2007 Base Case. The control measures will further reduce 2007 ozone levels in Oklahoma, so attainment is still achieved for all the control strategies when the 2001-2003 observed 8-hour ozone Design Values are used in the 2007 projections.
> Table ES-6 displays the 2007 projected 8-hour ozone Design Values for the Tulsa, Skiatook and OSDH monitors for the various 2007 emission control strategies using the 1998-2000 observed 8-hour ozone Design Values. The control measure not to allow several already permitted sources to build their facilities results in a 0.1 ppb reduction in the projected DVs at Tulsa and Skiatook. The 7.8 psi RVP gasoline measures, Stage II and Basic I/M control strategies all are sufficient to demonstrate attainment for the Tulsa monitor (84.9 ppb), but not the Skiatook

monitor (87.2 ppb) using observed 1998 – 2000 Design Values. **(ENVIRON, 2004)**

Table ES-6. Projected 2007 8-hour ozone Design Values (DVs) using the observed 1998-2000 DVs for 2007 Control Strategies at key monitors in Tulsa and Oklahoma City. (ENVIRON, 2004)

		2007/2000 8-Hr O_3 DV (ppb)		
No.	**Scenario**	**Tulsa**	**Skiatook**	**OSDH**
Obs	**1998-2000 Observed 8-Hr O_3 DVs**	**89**	**93**	**84**
0.	Revised 2007 Base Case	85.2	87.5	80.2
	Sensitivity Simulations			
2.	2007 5% VOC control in Tulsa MSA	85.1	87.4	80.2
3.	2007 5% NOx control in Tulsa MSA	85.1	87.1	80.2
4.	20075%VOC&NOxcontrolTulsaMSA	85.0	87.0	80.2
	2007 Emissions Scenarios			
5.	Remove Expiring Permitted Sources (control measure retained in subsequent strategies)	85.0	87.3	80.0
6.	7.8 RVP in Tulsa TMA	84.9	87.2	80.0
7	Stage I Controls in Tulsa MSA	85.0	87.3	80.0
8.	7.8 RVP in OKC TMA	85.0	87.3	79.8
9.	Stage I in OKC MSA	85.0	87.3	79.9
10.	TCMs in OKC TMA			
11.	7.8 RVP in TTMA 85% market penetration in on-road/non-road	84.9	87.2	80.0
12.	ITS/Transportation Congestion Mitigation in TTMA	NA	NA	NA
13.	Combined 11. and 12.	NA	NA	NA
14.	AEP-PSO Oolagah 1 Unit Low NOx	85.0	87.1	80.0
15.	OG&E Muskogee 1 Unit Low NOx	84.9	87.2	80.0
16.	GRDA Chouteau 1 Unit Low NOx	85.0	87.2	80.0
17.	Combine 13.-16.	NA	NA	NA
18.	Stage II in Tulsa MSA	84.9	87.2	80.0
19.	Basic I/M in Tulsa TMA	NA	NA	NA

IV. Local Recommendations/Plans

Local Recommendations

The Association of Central Oklahoma Governments

acog

association of

March 30, 2004

Mr. Eddie Terrill
Director, Air Quality Division
Oklahoma Department of Environmental Quality
707 N. Robinson
Oklahoma City, OK 73102

Dear Mr. Terrill:

We are pleased to transmit Central Oklahoma's local emissions reduction strategy for inclusion in the State of Oklahoma's Early Action Compact - Clean Air Action Plan (CAAP) submittal to EPA. This document is being submitted to you to meet the March 31 milestone.

ACOG, through a coordinated effort with your office, has identified a local emissions reduction strategy that will reduce transportation-related emissions by improving traffic flow and reducing congestion throughout the region. These Transportation Control Measures (TCMs) identified for the State Implementation Plan (SIP) are summarized in the table below.

TCM Category	TCM Commitments 2004-2005
#1) Transportation System Management (TSM): o Intersection Improvements o Signal Improvements o Cont. Left Turn Lanes	 51 Locations 30 Locations 3 locations (4 miles)
#2) Bicycle/Pedestrian Facilities	46 miles
#3) Freeway Corridor	29 locations (30 CCTVs and

Management (ITS)	100 Webcams)

As you are aware, air quality modeling for these TCMs is on going through an ODEQ contract with ENVIRON. As a result, emissions reduction cannot be quantified at this time. However, we share your optimism that the modeling results will be available to meet the CAAP's final submittal milestone on May 31, 2004.

In addition to the TCMs, a number of voluntary mobile source and transportation programs have been active in Central Oklahoma for over a decade. Programs such as the Central Oklahoma Clean Cities Program and ACOG's Air Quality Public Awareness Campaign have been instrumental in maintaining the region's compliance with federal air quality standards.

More information on each of the committed TCMs and voluntary programs are enclosed.

ACOG remains committed to the principals of the EAC and we look forward to working with you to develop an effective CAAP for Central Oklahoma.

Sincerely,

Zach D. Taylor

Enclosure

Summary of Transportation Control Measures and Air Quality Programs

March 2004

acog

Prepared by the Association of Central Oklahoma Governments

TABLE OF CONTENTS

FIGURE

TABLES

ATTACHMENTS

TCM #1: Transportation Systems Management (TSM) - Intersection Improvements, Signal Modification/ Interconnect and Continuous Left Turn Lanes

Background

On March 25, 2004, the ACOG Intermodal Transportation Policy Committee (ITPC) approved the use of state, regional and locally programmed (FY 2004 and 2005) TSM projects for inclusion in the preliminary EAC Clean Air Action Plan (Attachment 1).

It is believed that this strategy will reduce transportation-related emissions by improving traffic flow and reducing congestion throughout the region. These actions, if successful, will have the desired effect of reducing energy consumption and vehicle emissions. Furthermore, TSM strategies can postpone, or even eliminate the need for capital-intensive measures aimed at increasing roadway capacity.

A detailed list of committed TSMs is described in Table 1.

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	Commitment Year (FY)
Del City	SE 29th St.	@ Sooner Rd.		Signal Modification	2004
Del City	SE 29th St.	@ Bryant Ave.		Signal Modification	2004
Del City	SE 15th St.	Vickie Dr.	Sooner Rd.	Continuous Left Turn Lane	2005
Del City	SE 29th St.	Bryant Ave.	Sooner Rd.	Signal Interconnect	2005
Edmond	Kelly Ave.	@7th St.		Intersection Improvement	2004
Edmond	2nd St.	@ Vista Lane		Intersection Improvement	2004
Edmond	2nd St.	@ Bradbury Dr.		Intersection Improvement	2004
Edmond	Danforth Rd	@ Coltrane Rd.		Intersection Improvement	2004
Edmond	15th St.	@ Edgewood Dr.		Signal Modification	2004
Edmond	15th St.	@ Pine Oak		Signal Modification	2004
Edmond	Kelly Ave.	@ 33rd St.		Signal Modification	2004
Edmond	Kelly Ave.	@ 15th St.		Signal Modification	2004
Edmond	15th St.	@ Boulevard		Signal Modification	2004
Edmond	2nd St.	@ Bauman Ave.		Signal Modification	2004
Edmond	2nd St.	@ University Dr.		Signal Modification	2004
Edmond	2nd St.	@ Walmart entrance		Signal Modification	2004
Edmond	33rd St.	@ Edmond Crossing		Signal Modification	2004
Edmond	Danforth Rd.	@ Boulevard		Signal Modification	2004
Edmond	Danforth Rd.	@ Chowning Ave.		Signal Modification	2004
Edmond	Danforth Rd	@ Fretz Ave.		Signal Modification	2004
Edmond	Edmond Rd.	@ Santa Fe Ave.		Signal Modification	2004
Edmond	Danforth Rd.	@ Blackwelder		Signal Modification	2004
Edmond	15th St.	@ Rankin St.		Signal Modification	2004
Edmond	Boulevard	@ Covell Rd.		Intersection Improvement	2005
Edmond	33rd St.	@ Lincoln Ave.		Intersection Improvement	2005
El Reno	US-66	@ 27th St.		Signal Modification	2004

Midwest City	Douglas Ave.	SE 29th St.	SE 15th St.	Continuous Left Turn Lane	2003
Midwest City	NE 10th St.	@ Air Depot Blvd		Intersection Improvement	2004
Midwest City	NE 10th St.	@ Midwest Blvd.		Intersection Improvement	2004
Moore	SW 19th St.	@ Santa Fe Ave.		Intersection Improvement	2003
Moore	SW 19th St.	@ Telephone Rd.		Intersection Improvement	2003
Moore	Telephone Rd.	@ S. 4th St.		Intersection Improvement	2004
Moore	Telephone Rd.	@ S. 17th St.		Intersection Improvement	2004
Moore	SE 19th St.	@ Eastern Ave.		Intersection Improvement	2004
Moore	Eastern Ave.	@ Moore H.S.		Signal Modification	2005
Moore	SW 4th St.	@ Classen Ave.		Signal Modification	2005
Moore	SW 4th St.	@ Wilson St.		Signal Modification	2005
Norman	Robinson Ave.	@ 48th Ave. NW		Intersection Improvement	2003
Norman	Robinson Ave.	@ Brookhaven Blvd.		Intersection Improvement	2003
Norman	Porter Ave.	@ Robinson Ave.		Intersection Improvement	2003
Norman	Porter Ave.	@ Rock Creek Rd.		Intersection Improvement	2003
Norman	Gray St.	Flood Rd.	Porter Ave.	Signal Mod. / Interconnect	2003

Table 1: Intersection Improvement, Signal Modification/ Interconnect and Continuous Left Turn Lanes (cont.)

Agency	**Project Name**	**From**	**To**	**Project Description**	**Commitment Year (FY)**
Norman	Jenkins Ave.	@ Imhoff Rd.		Intersection Improvement	2004
Norman	24th Ave. SW	@ SH-9		Intersection Improvement	2004
Norman	Robinson Ave.	@ Woods Ave.		Signal Modification	2004
Norman	Robinson Ave.	@ Crossroads Ct.		Signal Modification	2004
Norman	Boyd St.	@ Flood Ave.		Intersection Improvement	2005
Norman	Jenkins Ave.	@ Imhoff Rd.		Intersection Improvement	2005
Norman	24th Ave. SW	@ SH-9		Intersection Improvement	2005
Norman	Boyd St.	@ Flood Ave.		Intersection Improvement	2005
Norman	US-77	@ Cedar Lane		Intersection Improvement	2005
Norman	36th NW Ave.	@ Rock Creek		Signal Modification	2005

		Rd			
ODOT	I-35	@ SH-9		Interchange Modification	2004
ODOT	I-35	@ I-240		Interchange Reconstruction	2004
ODOT	SH-9	@ Berry Rd.		Intersection Improvement	2004
ODOT	SH-130	@ US-62		Intersection Improvement	2004
Oklahoma City	Eastern Ave.	@ SE 44th St.		Intersection Improvement	2003
Oklahoma City	Eastern Ave.	@ SE 59th St.		Intersection Improvement	2003
Oklahoma City	Meridian Ave.	SW 29th St.	Reno Ave.	Continuous Left Turn Lane	2004
Oklahoma City	Eastern Ave.	@ SE 59th St.		Intersection Improvement	2004
Oklahoma City	Eastern Ave.	@ I-240		Intersection Improvement	2004
Oklahoma City	Meridian Ave.	@ SW 29th St.		Intersection Improvement	2004
Oklahoma City	Meridian Ave.	@ SW 15 St.		Intersection Improvement	2004
Oklahoma City	Meridian Ave.	@ Reno		Intersection Improvement	2004
Oklahoma City	MacArthur	@ 104th St.		Intersection Improvement	2004
Oklahoma City	MacArthur	@ SH-152		Intersection Improvement	2004
Oklahoma City	SW 54th St.	@ MacArthur Ave.		Intersection Improvement	2005
Oklahoma City	SW 54th St.	@ Portland Ave.		Intersection Improvement	2005
Oklahoma City	Drexel Blvd.	@ NW 23rd St.		Intersection Improvement	2005
Oklahoma City	Lake Hefner Pkwy	@ NW 122nd St.		Intersection Improvement	2005
Oklahoma City	NW 150th St.	@ Penn Ave.		Intersection Improvement	2005
Oklahoma City	NW 150th St.	@ Western Ave.		Intersection Improvement	2005
Oklahoma City	Sooner Rd.	@ I-240		Intersection Improvement	2005
Oklahoma City	Lincoln Ave.	NW 4th St.		Intersection Improvement	2005
Oklahoma City	Tulsa Ave.	@ NW 50th St.		Intersection Improvement	2005
Oklahoma City	Tulsa Ave.	@ NW 10th St.		Intersection Improvement	2005
Oklahoma City	May Ave.	@ NW 10th St.		Intersection Improvement	2005
Oklahoma City	Rockwell Ave.	@ Reno Ave.		Signal Modification	2005
Oklahoma City	Santa Fe Ave.	@ Kilpatrick Turnpike		Signal Modification	2005
Oklahoma	Council Rd.	@ Riverbend		Signal Modification	2005

City		Dr.			
Oklahoma City	Southwestern	@ SW 66th St.		Signal Modification	2005
Warr Acres	MacArthur Blvd.	@ NW 50th St.		Intersection Improvement	2004
Warr Acres	MacArthur Blvd.	@ NW 63rd St.		Intersection Improvement	2004
Warr Acres	MacArthur Blvd.	@ NW 36th St.		Intersection Improvement	2004

TCM #2: Bicycle and Pedestrian Projects

Background

In recent years, bicycle and pedestrian facilities have become more prevalent in the OCARTS area. Traditionally, cities and towns have planned and implemented trails independently. The Transportation Equity Act for the 21st Century (TEA-21) and its predecessor, the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA), charge metropolitan areas with the responsibility of developing a regional trails network through coordinated planning and implementation among jurisdictions. Development of a comprehensive bicycle network is fully supported by the goals established by the MPO for a higher quality, more efficient transportation system, that is environmentally and economically sound.

Existing and Planned System

Since 1996, the cities of Edmond[1], Norman[2], and Oklahoma City[3], have completed Trails Master Plans. These plans evaluate existing facilities and conditions, show corridors and areas where trails are needed or desired, describe design guidelines for bicycle and pedestrian facilities, list possible funding sources, and recommend an implementation plan for each city's trails. Consequently, the cities of Edmond, Norman, and Oklahoma City possess the majority of existing and planned mileage of bicycle facilities in the region.

Additionally, many other cities throughout the region have demonstrated significant interest in trails[4] by constructing trails in their communities with local,

---

[1]Edmond Trails and Sidewalk Master Plan, LandPlan Consultants, Inc., Adopted Sept. 13, 1999

[2]The Bicycle Transportation Development Plan with Initial Bikeway Routing Plan prepared for the City of Norman, Architects in Partnerships, Adopted June 26, 1996

[3]Oklahoma City Trails Master Plan, LandPlan Consultants, Inc., Adopted May 6, 1997

[4]On November 18, 1997, The City Council of the City of Choctaw passed a resolution designating approximately 40 miles of roadway shoulder for bike routes.

state, federal, and private funding. As of December 2003, there are nearly 84 miles of existing bicycle facilities in the region with an additional 46 miles committed to be constructed by the end of 2005. Table 2 lists the planned improvements.

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	Commitm Year (
Edmond	Mitch Park Trail	Santa Fe Ave. n/o Covell Rd	Kelly Ave. n/o Covell Rd.	4 miles	Bike/Pedestrian	2004
Oklahoma City	North Canadian Central Greenway Trail	May Ave.	Eastern	14 miles	Bike/Pedestrian	2004
Oklahoma City	Lake Overholser East Trail	NW 39^{th} Expwy.	NW 16^{th} St.	2.5 miles	Bike/Pedestrian	2004
Harrah	Community Trail Project: Phase II	NE 10^{th} St./ Church Ave.	Heritage Park	1 mile	Bike/Pedestrian	2005
Moore	Little River Commuter Trail	NW 5^{th} St. w/o I-35	Janeway Rd.	1.5 miles	Bike/Pedestrian	2005
Norman	Legacy Trail North	Acres St.	24^{th} Ave. NW	3 miles	Bike/Pedestrian	2005
Oklahoma City	KATY Trail	Reno Ave.	NE 50^{th} St.	7.5 miles	Bike/Pedestrian	2005
Oklahoma City	Lake Hefner to Lake Overholser Trail	W. Lakeshore Dr.	NW 39^{th} Expwy.	5.5	Bike/Pedestrian	2005
Oklahoma City	Lightning Creek Trail	SW 51^{st} St. / Harvey Rd.	Blackwelder to I-240	3 miles	Bike/Pedestrian	2005
Oklahoma City	North Canadian Central Greenway Trail Link	S. High St.	N. Bryant Ave.	1.5 miles	Bike/Pedestrian	2005
Tuttle	Tuttle Ped. & Bicycle Trail	Main St. @ Cimarron		1.5 miles	Bike/Pedestrian	2005
Edmond	Hafer Park Trail Reconstruction	Hafer Park		1.5 miles	Bike/Pedestrian	2004
Edmond	Fink Park Trail	Fink Park	Hafer Park	1 mile	Bike/Pedestrian	2005

TCM #3: Intelligent Transportation System Deployment in Central Oklahoma

Background

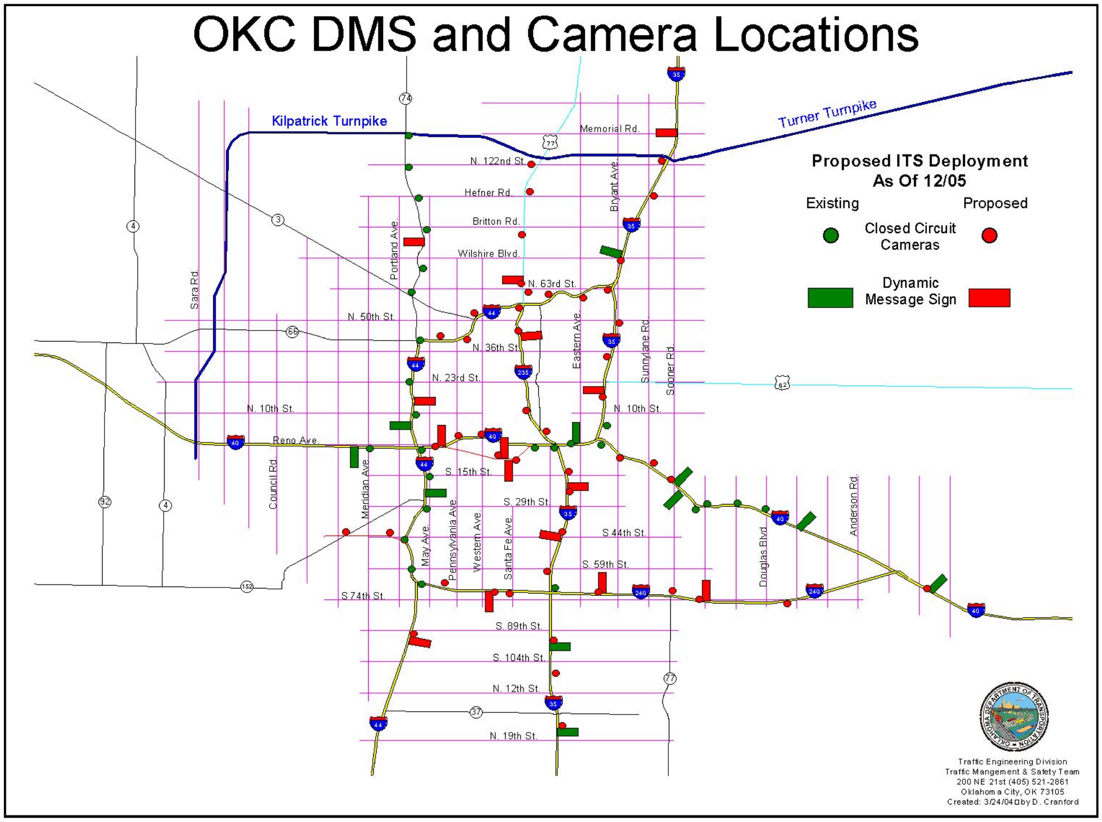
Intelligent Transportation Systems (ITS) is the application of information technology (i.e. computers, electronics, communications, sensors, safety systems, etc.) to transportation, so as to improve the quality of life by making travel safer, promote a strong and growing economy through better mobility, and enhance and protect environmental quality.

TEA-21 encourages the research, development, and use of ITS. In 1999, the Oklahoma Department of Transportation and the Association of Central Oklahoma Governments conducted an ITS Early Deployment Plan (EDP) study to improve the understanding of traffic incidents and recurring traffic congestion within the OCARTS region. The ITS EDP study provides a framework for using technology to enhance the OCARTS area transportation system and outlines short, medium, and long-term projects to address transportation problems and opportunities within the region. The Executive Summary outlining the three main elements of the ITS EDP study was accepted by the ITPC on October 28, 1999.

In Central Oklahoma, over 60 percent of the congestion is related to some form of incident. As a result, many of our ITS mitigation strategies have centered around incident management, such as the deployment of Dynamic Message Signs (DMS), closed circuit television (CCTV) and webcams. The philosophy behind this approach is to provide accurate, real time data to the motoring public so that they can make educated decisions on when and where to avoid traffic incidents. Existing (as of Dec 2005) and planned ITS activity are illustrated in Figure 1.

A description of specific ITS projects that are committed for deployment by the end of 2005 are located in Table 3.

Figure:



OKC DMS and Camera Locations
Kilpatrick Turnpike
Turner Turnpike
Proposed ITS Deployment
As Of 12/05
Existing
Proposed
Closed Circuit Cameras
Dynamic Message Sign
Memorial Rd.
N. 122nd St.
Hefner Rd.
Britton Rd.
Wilshire Blvd.
N. 63rd St.
N. 50th St.
N. 36th St.
N. 23rd St.
N. 10th St.
Reno Ave.
S. 15th St.
S. 29th St.
S 44th St.
S. 59th St.
S 74th St.
S. 89th St.
S. 104th St.
N. 12th St.
N. 19th St.
Sara Rd.
Council Rd
Meridian Ave.
Portland Ave.
May Ave.
Pennsylvania Ave.
Western Ave
Santa Fe Ave.
Eastern Ave.
Bryant Ave.
Sunnylane Rd.
Sooner Rd.
Douglas Blvd
Anderson Rd
Traffic Engineering Division
Traffic Mangement & Safety Team
200 NE 21st (405) 521-2861
Oklahoma City, OK 73105
Created: 3/24/04 by D. Cranford

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	Commitment Year (CY)
ODOT	2 CCTV 3 Webcams	I-44	@ I-204	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	I-44	@ SW 59th St.	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	I-44	@ Airport Rd.	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	I-44	@ SW 29th St.	ITS	2004-2005
ODOT	2 CCTV 5 Webcams	I-44	@ I-40	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	I-44	@ NW 10th St.	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	I-44	@ NW 23rd St.	ITS	2004-2005
ODOT	2 CCTV 4 Webcams	I-44	@ SH-66	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	SH-74	@ SH-3	ITS	2004-2005
ODOT	1 CCTV 2 Webcams	SH-74	@ Grand Ave.	ITS	2004-2005
ODOT	1 CCTV 3 Webcams	SH-74	@ Britton Rd.	ITS	2004-2005
ODOT	1 CCTV 3 Webcams	SH-74	@ Hefner Rd.	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	SH-74	@ Memorial Rd.	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	I-40	@ Meridian Ave.	ITS	2004-2005
ODOT	1 CCTV 6 Webcams	I-40	@ Gaylord	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	I-40	@ I-235	ITS	2004-2005
ODOT	1 CCTV 2 Webcams	I-40	@ Byers St.	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	I-40	@ I-35 S.	ITS	2004-2005
ODOT	1 CCTV 3 Webcams	I-40	@ Reno Ave.	ITS	2004-2005
ODOT	1 CCTV 2 Webcams	I-40	@ Scot St.	ITS	2004-2005
ODOT	1 CCTV 2 Webcams	I-40	@ SE 29th St.	ITS	2004-2005
ODOT	1 CCTV 2 Webcams	I-40	@ Air Depot Blvd.	ITS	2004-2005

Table 3: Intelligent Transportation System Projects (Cont.)

Agency	Projects Name	From	To	Project Description	Commitment Year (CY)
ODOT	1 CCTV 3 Webcams	I-40	@ Lockheed Blvd.	ITS	2004-2005
ODOT	3 Webcams	I-40	@ H Blvd.	ITS	2004-2005
ODOT	1 Webcam	I-40	@ Industrial Blvd.	ITS	2004-2005
ODOT	1 CCTV 3 Webcams	I-40	@ Douglas Blvd.	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	I-35	@ I-240	ITS	2004-2005
ODOT	1 CCTV 4 Webcams	I-35	@ Reno Ave.	ITS	2004-2005
ODOT	1 CCTV 5 Webcams	I-35	@ NW 4th St.	ITS	2004-2005

Central Oklahoma's Alternative Fuel Program – Clean Cities

Background

Clean Cities is a locally based, private industry and government partnership sponsored by the U.S. Department of Energy. Its objective is to facilitate the deployment of alternative fuel vehicles (AFVs) and to support the installation of an alternative fuel refueling infrastructure throughout the nation. Clean Cities also supports the objectives of the Clean Air Act Amendments of 1990 and the Energy Policy Act of 1992.

The U.S. Department of Energy designated the four-county Central Oklahoma area as a national Clean Cities region in May 1996. Efforts to obtain this designation began in early 1994 with U.S. Sen. Don Nickles (R-Okla.) and the late U.S. Rep. Mike Synar (D-Okla.). In September 1995, the Association of Central Oklahoma Governments began to organize a stakeholder coalition to pursue Clean Cities designation status.

Charter stakeholders included fuel suppliers, vehicle manufacturers and dealers, fleet managers, equipment suppliers and testing facilities, vehicle maintenance training facilities, utility providers, environmental groups, and federal, state, and local government agencies. These same stakeholders and new recruits make up today's Central Oklahoma Clean Cities coalition. Membership is open to anyone interested in helping to promote the goals of the Clean Cities program.

Mission

Since its 1996 designation, Central Oklahoma Clean Cities' partners and stakeholders have consistently sought to advance alternative fuel technology and the deployment of AFVs. The program is a catalyst for new jobs and industry in the region. The relationship all partners and stakeholders maintain is one that advances not only DOE goals, but also Oklahoma commerce and development goals.

The U.S. Department of Energy's Clean Cities program is a voluntary, locally based government/private industry partnership whose goal is to expand the use of alternatives to gasoline and diesel fuel, accelerate the deployment of alternative fuel vehicles and build a local alternative fuel infrastructure.

The Clean Cities program seeks to reduce national dependence on imported oil, and promotes the creation of commercial opportunities, new jobs and new businesses in the alternative fuels industry.

Accomplishments

The Central Oklahoma Clean Cities program has been successful in putting approximately 2500 AFVs on the roadways of the Oklahoma City area. Projections for 2007 suggest that AFVs in will increase to over 2800 and alternative fuel use will increase by over 51 percent. Tables 4 and 5 describe the present and projected (2007) alternate fuel vehicles use and alternate fuel consumption.

Table 4:
Early Action Compact
Clean Air Action Plan Emission Reduction Strategy:
Alternative Fuel Program – AFV Fleet Projections

	Private Fleet		**Municipal Fleet**		**State Fleet**		**Federal Fleet**		**Airport Fleet**		**Schools/Colleges Fleet**		**Total AFV**	
	2004	**2007**	**2004**	**2007**	**2004**	**2007**	**2004**	**2007**	**2004**	**2007**	**2004**	**2007**	**2004**	**2007**
L/D Clean Natural Gas (CNG)	183	190	33	100	10	0	263	200	13	15	8	20	510	525
M/D & H/D Clean Natural Gas (CNG)	374	380	6	0	8	0	56	56	8	8	53	30	505	474
L/D Propane (LPG)	1	1	0	0	5	0	0	0	0	0	0	0	6	1
M/D & H/D Propane (LPG)	77	77	0	0	0	0	0	0	0	0	0	0	77	77
L/D Electric	0	0	2	0	0	0	1	0	0	0	3	3	6	3
M/D & H/D Electric	0	0	2	0	0	0	0	0	0	0	1	1	3	1
Neighborhood Electric vehicles (NEVs)	0	0	0	6	0	1	11	11	0	1	2	2	13	21
Hybrid Electric Vehicles (HEVs)	0	3	0	1	1	3	0	0	0	1	2	2	3	10
M/D & H/D Biodiesel	109	130	0	100	0	100	672	672	0	0	0	0	781	1,002

L/D E-85	1	30	103	123	397	420	80	100	0	0	12	25	593	698
Total AFVs by Fleet	745	811	146	330	421	524	1,083	1,039	21	25	81	83	2,497	2,812

Table 5:
Early Action Compact
Clean Air Action Plan Emission Reduction Strategy:
Alternative Fuel Program – Alternate Fuel Use Projections

	Private Fleet		Municipal Fleet		State Fleet		Federal Fleet		Airport Fleet		Schools/Colleges Fleet		Tot
	2004	2007	2004	2007	2004	2007	2004	2007	2004	2007	2004	2007	2004
Clean Natural Gas (gge/yr)	615,705	630,000	8,500	25,500	250	0	25,250	20,000	15,411	15,500	20,000	15,000	685,116
Propane (LPG) (gal/yr)	115,500	115,500	0	0	300	0	0	0	0	0	0	0	115,500
Biodiesel (gal/yr)	50,000	75,000	0	100,000	0	50,000	192,446	192,446	0	0	0	0	242,446
E-85	300	30,000	0	14,000	0	280,000	0	8,000	0	0	0	10,000	300
Total	781,505	850,500	8,500	139,500	550	330,000	217,696	220,446	15,411	15,500	20,000	25,000	1,043,6

Central Oklahoma Air Quality Public Awareness Campaign

Background

The Air Quality Workgroup was formed in 1991 to implement a program to assist the region in remaining compliant with federal air quality standards. The workgroup includes staff from the Association of Central Oklahoma Governments (ACOG), Central Oklahoma Transportation and Parking Authority Metro Transit, Oklahoma Department of Environmental Quality (DEQ), OGE Energy Corp. (OG&E) and the Greater Oklahoma City Chamber of Commerce. Throughout the year the committee monitors the level of ozone and carbon monoxide in the region's air and implements the Clean Air Alert Day program.

In FY 2004, the workgroup will continue to implement a number of clean air initiatives including the Clean Air Alert Day Program and the "Get Your Own Square of Clean Air" public awareness campaign. These programs are described below.

Clean Air Alert Day Program

Established in 1992, the Clean Air Alert Day Program is designed to help citizens and employers take individual responsibility for keeping the Central Oklahoma region in compliance with federal air quality standards. In 2003, the program celebrated its 11th anniversary.

The Clean Air Alert Day program is an important mechanism used to help the Oklahoma City metropolitan area maintain its carbon monoxide (CO) and ozone (O_3) attainment status. Staff from the Oklahoma Department of Environmental Quality (ODEQ) and meteorologists from Oklahoma Gas and Electric (OG&E) monitor weather conditions on a daily basis. When the forecasted weather conditions[5] for the next day appear to be right

[5] The likelihood of high readings of a pollutant on any given day is monitored through the use of a Dispersion Index (DI). The Dispersion Index formulas, developed in FY 1992, are used for forecasting the likelihood of forming high ozone and CO levels, and are based on factors affecting the formation of high levels of CO and ozone. These factors include temperature, precipitation, wind, and cloud coverage

for accumulation of high levels of a specified pollutant, such as carbon monoxide or ozone, staff from ODEQ, OG&E and ACOG calls a Clean Air Alert Day. Area citizens are notified the day before an Alert Day, and asked to modify their travel behavior accordingly, with strongest emphasis given to reducing vehicle miles of travel.

---

for both CO and ozone, and inversion potential (a condition where warm air at upper levels traps cool air at lower levels, the inverse or opposite of the typical phenomena where cooler temperatures are found at higher levels of the atmosphere) for CO. The Dispersion Index is closely monitored by the work group on a daily basis, and provides the groundwork for advising the public. When the forecasted conditions (Dispersion Index) indicate a likelihood of high CO or ozone levels, ODEQ staff consults with other members of the air quality technical work group and the National Weather Service, and decides whether to call a Clean Air Alert Day.

Air Quality Public Awareness campaign

Prior to 1998, public education efforts regarding air quality in Central Oklahoma had largely been done through donated media time, the creation of news stories, public service announcements and through the Clean Air Alert Day program. In 1998, the Workgroup began to develop strategic marketing and public education programming using paid media in order to emphasize the importance of air quality to the region.

Despite elevated levels of ozone during the past five summers, the region has been able to stay in compliance, thanks largely to public involvement and responsible citizen activity, as well as favorable weather conditions.

The Oklahoma Department of Transportation (ODOT) provides the Association of Central Oklahoma Governments (ACOG) with federal Congestion Mitigation Air Quality (CMAQ) funding. Starting in fiscal year 2000, a portion was used to assist the Central Oklahoma region with maintaining its air quality attainment status. This funding, authorized by the Federal Highway Administration and ODOT for continuation of the regional Air Quality Awareness Program, promotes clean air habits, air quality awareness and the Clean Air Alert Day program.

Accomplishments

In 2003, the ACOG Air Quality Workgroup continued its award-winning program with a media campaign that utilized television, radio, movie theater, billboard and Internet mediums to spread the word, as well as a "street team."

- o The electric mower campaign radio schedule had a potential to reach 68.5 percent (411,200) of metro adults, ages 18-54, an average of 7.7 times.
- o The impact for network television advertising was 60.7 percent of the Oklahoma City metropolitan media market population (361,500 people), in the age range of 18-54, reached an average of 3.7 times.

- The reach for cable television advertising on Cox Communications/CableRep was based on households: Advertising was able to reach 96.1 percent of Oklahoma City metropolitan cable subscribers (225,000) approximately 46 times.
- The general radio schedule had a potential of reaching 60.7 percent of metro adults (361,500), aged 18-54, an average of 3.7 times.
- The combined daily potential reach for four outdoor billboards was 164,873 vehicles.

As a result of the program, the ACOG Air Quality Workgroup developed valuable relationships with campaign partners, including Cox Communications, CableRep Advertising, Black and Decker/Dewalt, Citadel Communications, Redbud Energy and local radio and television stations with addressing the importance of clean air and transportation issues related to clean air in Central Oklahoma.

In the spring and fall of 2003, the Workgroup conducted the first substantial public opinion surveys on air quality in Central Oklahoma. The impact of the Alert Day program and public education efforts have been difficult to measure prior to this year. The survey was collected from a sample of nearly 400 Central Oklahoma households in April and October. Some of the post-season survey results include:

- Almost 69 percent of respondents had remembered hearing about an Alert Day notice this summer.
- Nearly 72 percent of respondents polled last month believe that knowing when an "Alert Day" was called was important.
- When asked if they practiced specific actions on Alert Days, nearly 57 percent of respondents said that they postponed mowing the lawn, and 61 percent said that they gassed up their car in the evening.

A comprehensive description of the 2003 Public Awareness Campaign activities is available in Attachment 2.

ATTACHMENT 1:
ITPC MARCH AGENDA ITEM –
EARLY ACTION COMPACT – CLEAN AIR ACTION PLAN SUBMITTAL TO EPA

ACOG

Association of Central Oklahoma Governments

21 E. Main St, Suite 100, Oklahoma City, OK 73104-2405
(405) 234-2264 Fax: (405)234-2200 TDD: (405) 234-2217
www.acogok.org e-mail: acog@acogok.org

MEMORANDUM

DATE: March 18, 2004

TO: Intermodal Transportation Policy Committee (ITPC)

FROM: Douglas W. Rex, Asst. to the Executive Director
Program Coordinator, TPDS

SUBJECT: Early Action Compact –Clean Air Action Plan Submittal to EPA

INFORMATION:

On December 31, 2002, the Central Oklahoma region notified the Environmental Protection Agency (EPA) of its intent to participate in a new air quality strategy called the 8-Hour Ozone Early Action Compact (EAC). The EAC program provides communities with an opportunity to meet the new stricter 8-hour ozone standard using locally tailored pollution controls – instead of federally mandated measures. The program is designed for areas that approach exceedances of the 8-hour standard, but are in attainment for the 1-hour ozone standard. As you may know, Central Oklahoma matches this description – our area has approached exceedances of the 8-hour standard, but remains in attainment of the 1-hour ozone standard.

The EAC provides regions like Central Oklahoma, with a tremendous “safety net” in the event that we violate the 8-hour standard. As long as the agreements and milestones in the EAC are met, even if Central Oklahoma were to violate the ozone standard, EPA would defer the effective date of our nonattainment designation. That, in effect, would allow Central Oklahoma to continue with its air quality planning and action program without the economic costs associated with full "dirty air list" status.

The next key milestone is March 31. On this date, EPA is requiring that EAC participants submit a preliminary Clean Air Action Plan (CAAP) for review. A key component of this CAAP is the selection of a local emission reduction strategy.
ACOG staff, through a coordinated effort with the Oklahoma Department of Environmental Quality (ODEQ) and the Indian Nations Council of Governments (INCOG) has identified a strategy that will reduce transportation-related emissions by improving traffic flow and reducing congestion throughout the region. These Transportation Control Measures (TCMs) will include: intersection improvement projects, signal improvements and signal coordination efforts. Central Oklahoma's strategy will concentrate on TCMs that are currently programmed at the state (STIP), regional (TIP) and/or local (CIP) level. A list of proposed projects will be available at the ITPC's March meeting.

Unfortunately, the EAC committee schedule was such that staff was unable to bring this information to the ITTC, but we will provide this memorandum at the April ITTC meeting as an information item. Staff will continue to keep the ITTC and ITPC apprised of the progress of the EAC.

ACTION REQUESTED:

Motion to approve the use of state, regional, and locally programmed transportation control measures for inclusion in the preliminary EAC Clean Air Action Plan.

ATTACHMENT 2:
SUMMARY OF 2003 AIR QUALITY PUBLIC EDUCATION PROGRAM

Get your own square of clean air

Summary of 2003 Air Quality Public Education Program

October 2003

acog

Prepared by the Association of Central Oklahoma Governments
Clean Air Committee

Summary of 2003 Air Quality Public Education Activities and Programs

Introduction

Established in 1992, the Clean Air Alert Day Program is designed to help citizens and employers take individual responsibility for keeping the Central Oklahoma region in compliance with federal air quality standards. In 2003, the program celebrated its 11th anniversary.

Throughout the year, the ACOG Clean Air Committee, which includes staff from the Association of Central Oklahoma Governments (ACOG), Central Oklahoma Transportation and Parking Authority Metro Transit, Oklahoma Department of Environmental Quality (DEQ), OGE Energy Corp. (OG&E) and the Greater Oklahoma City Chamber of Commerce, monitors the level of ozone and carbon monoxide in the region's air and implements the Clean Air Alert Day program.

The Clean Air Committee notifies local media and calls attention to Alert days - when weather conditions may be conducive for high readings of ozone or carbon monoxide. Informing the public a day in advance gives people the opportunity to plan their activities, in hopes of reducing pollution levels.

In 1997, the Environmental Protection Agency (EPA) tightened ozone standards, citing the need to protect 125 million Americans, including 35 million children, from adverse health effects caused by air pollution.

In Central Oklahoma, the new standard caused great concern because it coincided with one of the worst three-year spans of summer weather in state history, making adherence to the standard even more difficult.

Prior to that time, public education efforts regarding air quality in Central Oklahoma had largely been done through donated media time, the creation of news stories, public service announcements and through the Clean Air Alert Day program. In 1998, the Committee began to develop strategic marketing and public education programming using paid media in order to emphasize the importance of air quality to the region.

Despite elevated levels of ozone during the past five summers, the region has been able to stay in compliance, thanks largely to public involvement and responsible citizen activity, as well as favorable weather conditions.

Background and Funding

The Oklahoma Department of Transportation (ODOT) provides the Association of Central Oklahoma Governments (ACOG) with federal Congestion Mitigation Air Quality (CMAQ) funding. Starting in fiscal year 2000, a portion was used to assist the Central Oklahoma region with maintaining its air quality attainment status. This funding, authorized by the Federal Highway Administration and ODOT for continuation of the regional Air Quality Awareness Program, promotes clean air habits, air quality awareness and the Clean Air Alert Day program.

Additional funding from private sources could also be used for the campaign. Use of this federal funding was contingent upon obtaining contributions from a corporate or private sponsor to be utilized as the required local match for the federal funds.

For the 2003 campaign year, contributions came from OGE Energy Corp. This contribution was used specifically for the electric mower/radio promotion that is detailed in this report.

In addition, Redbud Energy contributed substantial funding to the Central Oklahoma Clean Air Campaign. Funding from Redbud supplemented the program's radio campaign and helped fund the Committee's first pre and post-season public survey on air quality behaviors in Central Oklahoma.

Marketing and Advertising Partner

In January 2002, the Committee began a search to secure an advertising agency to help service the program.

In accordance with ACOG purchasing policy, advertising and marketing agencies within the region were sent a Request for Proposals (RFP) to declare their interest in the project and provide information that would detail their abilities to service the campaign.

The RFP was sent to over 40 agencies in the region asking for service fees, agency background information and a letter of interest. Concerted efforts were made to assure that the search process was as complete and fair as possible.

Third Degree Advertising, an Oklahoma City based company, was unanimously selected by the committee to carry out marketing program, because the company's goals and objectives best fit those of the selection committee. A section of the agreement also allows for the Committee and Third Degree to continue the contract for up to three years, without having to undergo the RFP process. The 2003 campaign marked the second year of working with Third Degree.

In addition to committee and funding partnerships, the program has benefited from donations from the Oklahoma City Black and Decker (Dewalt) dealership and Cox Communications/CableRep, as well as concentrated media exposure through the Daily Oklahoman and metro television news programming.

Clean Air Alert Days for Ozone (Ozone Alert Days) in 2003

The region was again able to stay in compliance with federal air quality standards. There were seven Alert Days called in the summer of 2003. The region did not experience any violations in the national air quality standard. Repetitive alert days do not count against the region as far as its air compliance status. The emphasis of the forecasts is to prevent high ozone readings for the pending day.

Wednesday, July 2
Thursday, July 3
Wednesday, July 30
Wednesday, August 6
Thursday, August 7
Saturday, August 23
Tuesday, August 26

Alert Day History

A history of Alert Days in the region has helped developed the media schedule for the season. There have been 71 Alert days called in the past 11 years

Year	Alert Days Called
1993	1
1994	3
1995	3
1996	2
1997	3
1998*	14
1999	11
2000	13
2001	8
2002	6
2003	7

**8-hour standard introduced*

Lined up chronologically based on the month and date, 90 percent of Alert Days in the past decade have occurred between July 1 and September 13. This is the time of the year where the core of the media program is concentrated.

Month	# of Days	Percentage
May	1	1.4 %
June	6	8.5 %
July	16	22.5 %
August	35	49.3 %
September	13	18.3 %

Public Opinion Survey

This spring, the Committee conducted the first substantial public opinion survey on air quality in Central Oklahoma. The impact of the Alert Day program and public education efforts have been difficult to measure prior to this year. In April, the ACOG Clean Air Committee began the first series of surveys that will provide a benchmark for evaluating the program and data that can help improve the campaign.

Some findings from the first survey include:

- When asked if they thought air pollution in the region was becoming better, staying the same or becoming worse, 27.6 percent of respondents stated that they believed that air pollution in the region is becoming worse.
- When asked if they were concerned about the health, economic and environmental consequences of poor air quality in the region, 67.8 percent of Central Oklahomans surveyed said that they were either "very" or "somewhat" concerned.
- When asked if they could remember hearing about a Clean Air Alert Day notice last summer, 72.7 percent of respondents said yes.
- When asked if they knew what a Clean Air Alert Day indicated, 49.5 percent of those surveyed answered correctly that it was a forecast that the air had potential to become polluted.
- Of those who knew what a Clean Air Alert Day indicated, 77.1 percent believed it was important to be notified of Clean Air Alert Days, or "ozone alert" days.

The survey was developed by ACOG and compiled by Insight Market Research and Third Degree Advertising. A total of 385 telephone interviews were conducted with adults in the Central Oklahoma region, with a geographic breakdown of 65.9 percent in Oklahoma County, 23.2 in Cleveland County and 10.7 percent in Canadian County. The breakdown corresponds with regional commuting patterns.

The survey also asked respondents if they performed any specific actions on an Ozone Alert Day last summer.

- When asked if they participated in a car pool, 19.8 percent of respondents said that they have shared a ride.
- When asked if they postponed mowing the lawn, 57.6 percent yes.
- When asked if they avoided outdoor grilling with lighter fluid, 48.7 percent said yes.
- Over half, or 54.9 percent of respondents, filled their vehicles with gas during the evening, and 43 percent said that they quit "topping" off the tank.
- When asked if they utilized public transportation, 13 percent of respondents said that they did.

Complete pre and post-season surveys are available as separate publications at ***www.acogok.org***.

Mower Promotion

This spring, the Association of Central Oklahoma Governments (ACOG) Clean Air Committee, along with its partners, OG&E Electric Services and Black and Decker, developed a radio promotion with the Citadel Radio Group in Oklahoma City to promote clean air in the region.

Engaging citizens in air quality has always been a problematic promotional challenge for the group. Since Oklahoma City remains in good air quality status with the EPA, it has been hard to convince citizens to take part in Ozone Alert Day precautions. So, this year, the group focused on emphasizing "every day" lifestyle habits, such as mowing the lawn.

The group was able to develop a promotion with the radio group to talk about good "clean air" habits, such as avoiding lawn mowing on Alert Days. Or, better yet, mowing instead with environmentally friendly electric mowers!

The group secured six electric lawnmowers from a local Black and Decker dealer ($450 retail value each), and with supplemental funding from OG&E Electric Services; a promotion was developed to promote clean air, lawn care and electricity. The program brought together three different partners with three different motivations, but all sharing a unifying objective.

Celebrities in Oklahoma City are hard to find, and there is a great emphasis on members of the media being "almost famous." So, a promotion was developed, using the Committee's Web site, ***www.letscleartheair.org***, where radio listeners could "vote" for the radio personality that they wanted to mow their lawn.

A random winner for each station was drawn through a computerized random number sampler and declared the winner of the mower. The mower was delivered by the winner's favorite radio personality. Six stations were utilized, with each station's promotion running for two weeks. The promotion included a dedicated 60-second radio spot, personalized for each station, using specific talent, along with live "traffic" reads. After one week, another station's promotion would start, so the entire promotion lasted seven weeks, from May to June, during prime mowing season.

The promotion was able to reach many different audiences, since the formats for all six stations were vastly different. The electric mowers were awarded in conjunction with **Citadel Radio Group**, including **KATT-FM** (modern rock), **WWLS-FM** (sports talk), **KYIS-FM** (adult contemporary) **WKY-AM** (political talk), **KKWD-FM** (commercial hits and urban) and **KQBL-FM** (contemporary country) radio stations.

The Mow Zone campaign radio schedule had a potential to reach 68.5 percent (411,200) of metro adults, ages 18-54, an average of 7.7 times.

Winners included: **Troy Knight**, **Sherry Hayes**, **Robert Vaught**, and **Janice Baker**, **Oklahoma City**, **Jonathan Wright**, **Midwest City** and **Walter Rowe**, **Edmond**.

Because of the promotion, many home improvement stores not involved in the promotion sold out of their electric mower stock, and the Committee took public inquiries about the mowers and its clean air benefits. In addition to the regular promotion, participating radio stations also aired the radio personalities actually "mowing," which allowed for even more coverage on air quality and air quality habits.

All partners, including the Clean Air Committee, OGE, Black and Decker and the Citadel Group plan on repeating the promotion again in spring 2004.

KATT winner

K-BULL winner

KYIS-FM winner

WWLS-AM/FM winner

Wild 97.9 winner

WKY-AM winner

Marketing Program

The campaign involved five primary mediums, including television, radio, outdoor, movie theater and the Internet. In addition, other projects, such as print, premiums and public outreach through a "street team" helped to continually promote air quality in the region.

Television

With 2003 being the second year of the partnership with Third Degree, and the second year of the "Clean Air Square" brand, the media program benefited by items that were produced in 2002.

In 2003, the two television spots that were produced the previous year were utilized. This helped generate consistency and also helped alleviate production costs that would have been spent creating new commercials.

The images featured Central Oklahomans enjoying family and outdoor activities, with a narrator explaining how each featured individual did his or her part to "help clear the air." Situations included transit use, gassing up at night, using electric lawn care equipment, and not mowing on Clean Air Alert Days.

Network stations contracted to run the ads in June, July, August and September included KOCO-TV, KFOR-TV and KWTV-9.

The reach for the network television advertising was able to reach 60.7 percent of the Oklahoma City metropolitan media market population (361,500 people), in the age range of 18-54, an average of 3.7 times.

Also, Cox Cable and CableRep offered a leveraged media buy that resulted in several thousand "free" runs. Cox utilizes a computer program that slips the spots on 41 different cable channels throughout the summer, at random times of the day. Stations include E!, VH-1, MTV, ESPN, CNN, Univision, Fox Sports, TNN and Lifetime. The final schedule, if paid at the open rate, would result in a substantial sum. Cox and CableRep have offered this schedule for the past few years and are valued highly by the committee.

The reach for cable television advertising is based on households: Advertising was able to reach 96.1 percent of Oklahoma City metropolitan cable subscribers (225,000) approximately 46 times.

Radio

Three 60-second spots were created for the radio portion of the program. The spots focused on an all-knowing "clean air man" who visited random Central Oklahomans enjoying the great outdoors, working on their automobiles and at their homes. The "clean air man" thanked the people for helping to keep the air clean by practicing good clean air habits.

Stations included KMGL-FM (adult contemporary), KOMA-AM (oldies), KRXO-FM (classic rock), KTOK-AM (talk) and KATT-FM (hard rock).

In addition to the 60-second ads, "liners" and "traffic reports sponsorships" were included in the radio buys. A "liner" involved a live or recorded 10-second message encouraging clean air habits, and generally preceded a live report, sports report, traffic report, weather report or other regular feature of a station.

The radio schedule had a potential of reaching 60.7 percent of metro adults (361,500), aged 18-54, an average of 3.7 times.

Billboards (outdoor)

Like television, media work performed in 2002 carried over in 2003 with outdoor advertising.

Vinyl artwork utilized last year was still good enough to be re-used in 2003, so no funding was spent on production. Also, a leverage buy with the outdoor vendor provided a discount on billboard leasing.

Four outdoor locations were used this summer with the boards posted from June to September. Outdoor locations included:

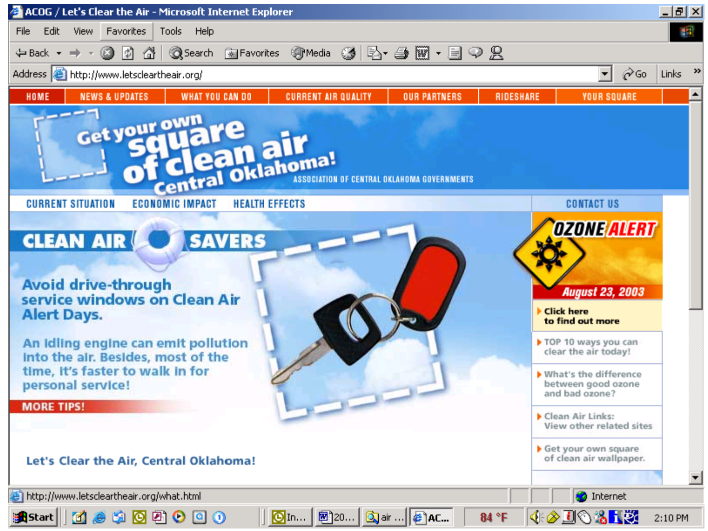
8817 S. I-35 (*daily traffic: 48,236*)
Broadway and N.W. 122(*daily traffic: 38,386*)

I-40 and Virginia (*daily traffic: 47,785*)
7440 N. I-35 (*daily traffic: 30,466*)

The billboards were similar in appearance, but each had a different "theme," which ranged from Clean Air = Fun Outdoors, Clean Air = A Better Future, Clean Air = Healthy Kids, and a general one with the primary brand. *The combined daily potential reach for the four billboards was 164,873 vehicles.*

Internet

The clean air Web site at ***www.letscleartheair.org*** was re-designed, with more graphics, friendlier navigation, a more dynamic news page and emphasis on the "clean air savers" sub-brand. During peak season, the site averages between 800-1,200 unique visits a day.



Print

The committee did not print any collateral pieces this year. In May, the first print ad by the group was featured in a full-page in Oklahoma City Downtown magazine. The magazine is a lifestyle publication produced by locally-owned Mattison Avenue publishing. Placement for the ad was free because of ACOG's membership in the Bricktown Association.

The circulation for the magazine is 52,500.

Movie Slides

Movie theater advertising was tried for the first time in summer 2003. The committee developed five different slides that were shown prior to feature movies at the AMC Quail Springs 24 Movie Theater.

The images marked the debut of the "clean air savers" sub-brand, featuring visual images of frequently promoted clean air tips.

Based on the relatively low-cost of this medium, the venture was considered a success. Slides ran from mid-June to September throughout a summer blockbuster season that included hit movies such as, "The Hulk," "Pirates of the Caribbean," "Terminator 3" and "Finding Nemo."

The average attendance of Quail Springs is 35,000 people per week. On average, each person sees a slide three times prior to a feature's start, meaning a potential of 105,000 impressions per week. Multiplied by 11 weeks, there is a potential for 1,155,000 impressions. Given that half of the impressions are likely to duplicate audience members (same people seeing different movies throughout the duration of the movie season), this number is difficult to accurately quantify.

Public Outreach

The Committee participated in more public events this summer, including an Earth Day event in April called ScienceFest at the Oklahoma City Zoo, and at a Cox Communications event at Frontier City amusement park.

A "street team," known as "Team Ozone" also made the rounds in Bricktown and in downtown Oklahoma City during a few Ozone Alert Days this summer. With matching "uniforms," the group interacted with the public, talked to them about Alert Days and distributed brochures and premium items. Response was mixed. Some people were very friendly, and some were not. The concept will be revisited next year.

Premium materials

New public education materials included items such as golf tees, stress squeezers, scrambler puzzles and puzzle pens. These are inexpensive items featuring the Web site URL that are intended to be given out to the public whenever appropriate.

Awards

The Central Oklahoma Clean Air Campaign was recently awarded with one of the highest honors in advertising and marketing in the metro area. The Oklahoma City Ad Club presented the American Advertising Awards, or ADDYs, generally known as the "Grammys" and "Oscars" of local advertising, last month.

The public education program, which is managed by the ACOG Clean Air Committee, won a Silver Merit ADDY for each of its three outdoor (billboard) designs, in the public service, out-of-home category. The outdoor campaign also won a Bronze Merit award in the category of Public Service Campaign.

Public and Media Assistance

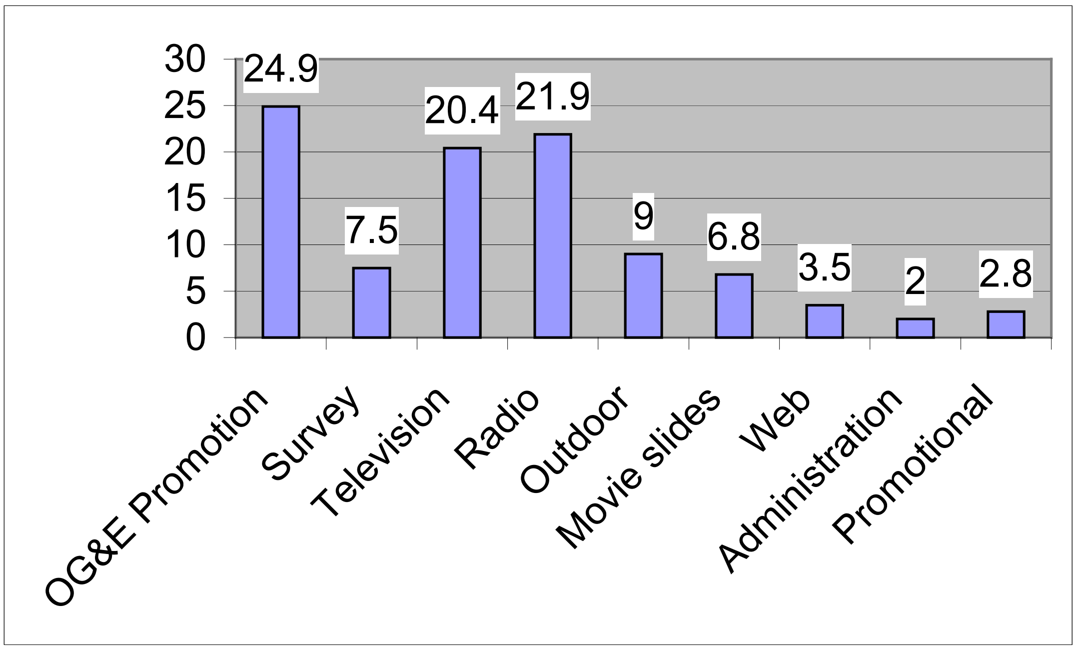
Feedback from the public has become a regular component of ozone season. Staff took phone calls and answered e-mails. Inquiries ranged from people who were curious, to those who were angry. Such reaction is fairly typical.

In addition to public and member inquiries, the committee assisted the media on many occasions:

Also, the Daily Oklahoman featured news and information on the front page on each Clean Air Alert day.

Budget Allocation Strategy

Much emphasis was placed on achieving balance in the campaign. The chart below illustrates that spending in each medium was distributed fairly equally. The mower program includes radio production, media purchasing and the cost of five electric mowers. Savings from not having to produce new billboard art and TV spots allowed for new programming such as the survey and the slides.



Allocation of projects by percentage

Clean Air Tips

Over the years, the committee has developed a handy list of clean air habits that everyone can incorporate in their daily routine. These are proactive measures that don't require much time, money and effort, yet, if performed by enough people on a summer day, can be increasingly effective in curbing ozone levels. These "top 10" tips were utilized throughout the campaign, and were integrated in nearly all of the new marketing literature.

1. Gas up your vehicle at night. Ground level ozone – or smog – is formed when chemicals from car exhaust mix with sunlight. If you gas up when there's no sunlight, you lessen the chance to create smog.

2. Keep your automobile maintained. Cars that are tuned, with properly inflated tires and new air filters, not only use less gasoline, but they also run cleaner.

3. "Trip-chain," by organizing and combining several errands into one outing. Try to organize your errands into one trip. It will also save wear and tear on the car.

4. Avoid lawn mowing on Clean Air Alert Days, unless you have an electric mower. Some gasoline-powered lawn mowers run for one hour emit as much pollution as a car driven from Central Oklahoma to Albuquerque, New Mexico!

5. Ride the bus to work or school. On Clean Air Alert Days, the fare is FREE this year. Call Metro Transit at 235-RIDE for route information.

6. Try not to "top-off" the tank when gassing up a vehicle. Gasoline spillage evaporates into the air. Topping off occurs when people want to squeeze an "extra few cents" of gasoline into a tank that's already full.

7. Carpool. Sharing a ride takes one car off of the road for every rider. It eases congestion and

provides the opportunity to meet new friends. For information on the Rideshare carpool matching service, call 235-RIDE.

8. "Take a walk," or ride a bicycle when possible. It's good exercise and it can keep extra motor vehicles off of the roadways.

9. Avoid drive-through windows at restaurants, banks, cleaners, etc. An idling engine can emit pollution into the air. Besides, it's faster to walk in and get personal service!

10. Limit charcoal grill usage on Alert Days. Charcoal lighter fluid evaporates when it burns, causing chemicals to rise into the air.

Schedules and media coverage (This material is available as a hard-copy attachment)

Sampling of print media coverage:

"City, Tulsa look to cut emissions," Daily Oklahoman, May 23, 2003
"Clean Air compliance found by area survey," Daily Oklahoman, May 27, 2003
"Clearing the Air (editorial)," Daily Oklahoman, May 27, 2003
"Reduction of air pollution urged," Daily Oklahoman, July 2, 2003
"City, Tulsa issued second alert for reducing ozone emissions," Daily Oklahoman, July 3, 2003
"Oklahoma City Clean Air Alert Program" Greater Oklahoma City Chamber of Commerce, The Point, July 2003
"Breathing easier..," Oklahoma Gazette, July 3, 2003
"Groups work to clear air," Sunday Oklahoman, July 6, 2003
"Clean Air Alert" Web view from Oklahoma City Web site, www.okc.gov., July 3, 2003
"Fouling Our Air (editorial)," Daily Oklahoman, July 25, 2003
"Turning Point (letter to editor)," Daily Oklahoman, July 28, 2003
"Ozone alert in effect today," Daily Oklahoman, July 30, 2003
"Deadline looms for air project," Daily Oklahoman, July 31, 2003
"Fourth ozone alert of year issued today," Daily Oklahoman, August 6, 2003
"Warm temperatures bring cities under ozone alert," Daily Oklahoman, August 7, 2003
"Today marks Clean Air Alert Day," Daily Oklahoman, August 23, 2003
"Central Oklahoma ozone alert set today," Daily Oklahoman, August 26, 2003
"Officials develop air quality plans for city, Tulsa," Daily Oklahoman, October 4, 2003

Full page ad from Downtown Oklahoma City magazine, May 2003 issue
2003 clean air television schedule (network, not cable)

2003 clean air radio schedule (regular radio, not mower program)
2003 mower program radio schedule and promotional material related to mower program

Local Recommendations

The Indian Nations Council of Governments

INCOG
a voluntary association of local governments serving creek, osage, rogers, tulsa and wagoner counties
201 west 5th street, suite 600 tulsa, oklahoma 74103-4236 918/584-7526

March 30, 2004

Mr. Eddie Terrill
Oklahoma Department of Environmental Quality
707 N. Robinson
Oklahoma City, OK 73102

Dear Eddie:

On March 25, 2004 the INCOG Board of Directors adopted Resolution #185:

> *RESOLUTION APPROVING THE (ATTACHED) TULSA AREA EARLY ACTION COMPACT (EAC) CLEAN AIR ACTION PLAN (CAAP) RECOMMENDATIONS; AND, AUTHORIZING THE CAAP RECOMMENDATIONS BE SUBMITTED TO THE DEPARTMENT OF ENVIRONMENTAL QUALITY FOR INCORPORATION INTO THE OKLAHOMA AIR QUALITY STATE IMPLEMENTATION PLAN.*

This resolution and supporting documentation represents the Early Action Compact March 31, 2004 milestone identifying local emission reduction strategy recommendations for the Tulsa Area Clean Air Action Plan.

We value our partnership with ODEQ and mutual commitment to ensure clean air for the Tulsa community and the state.

Sincerely,

Jerry Lasker
Executive Director

Enclosures

RESOLUTION 185

RESOLUTION APPROVING THE (ATTACHED) TULSA AREA EARLY ACTION COMPACT (EAC) CLEAN AIR ACTION PLAN (CAAP)RECOMMENDATIONS; AND, AUTHORIZING THE CAAP RECOMMENDATIONS BE SUBMITTED TO THE DEPARTMENT OF ENVIRONMENTAL QUALITY FOR INCORPORATION INTO THE OKLAHOMA AIR QUALITY STATE IMPLEMENTATION PLAN

WHEREAS, the Indian Nation Council of Governments (INCOG) represents the Tulsa metropolitan planning organization and fifty-two local governments located in Creek, Osage, Tulsa, Wagoner, Rogers, Muskogee, and Washington counties in Northeastern Oklahoma; and

WHEREAS, the INCOG region is meeting both the 1-Hour AND the 8-Hour Revised National Ambient Air Quality Standard (NAAQS) for ozone established by the US Environmental Protection Agency (EPA); and

WHEREAS, INCOG is proactively working to reduce regional ozone air pollution and has entered into an Ozone Early Action Compact (EAC) agreement with the Oklahoma Department of Environmental Quality (ODEQ) and the EPA; and

WHEREAS, the Early Action Compact is an agreement which commits to reducing ground level ozone pollution to ensure clean air and attainment at the monitors sooner than what would be required by the Clean Air Act; and

WHEREAS, INCOG is in full compliance with EAC requirements, milestones and other obligations; and

WHEREAS, recommendations for a Clean Air Action Plan (CAAP) are to be submitted to ODEQ by March 31, 2004 for incorporation into the State Implementation Plan by December 31, 2004.

NOW, THEREFORE BE IT RESOLVED that the Indian Nations Council of Governments supports, endorses and approves the attached Early Action Compact Clean Air Action Plan recommendations and is providing it for implementation and incorporation into the State Implementation Plan.

ADOPTED this 25th day of March, 2004.

Chairman, INCOG Board of Directors

ATTEST:

Phil Wood

Phil Wood, Secretary

3-25-04

INCOG

Tulsa Area Early Action Compact (EAC) Recommendations

*The Clean Air Action Plan (**CAAP**) serves as the Tulsa Area EAC air quality improvement plan to ensure the region stays in attainment of the 8-hour standard. It will be incorporated into the formal State Implementation Plan (SIP) submitted to EPA and the area will be legally required to carry out this plan just as in nonattainment areas.*

*The **projected 2007** 8-hour ozone Design Values (revised base case including heavy duty diesel rulemaking) for the Tulsa area monitors of concern are: **Skiatook = 87.5 ppb and Tulsa = 85.2 ppb***

The INCOG Air Quality Committee and the INCOG Transportation Policy Committee make the following recommendations for incorporation into the Tulsa Area Clean Air Action Plan (CAAP):

1) The CAAP will include the following emission reduction strategies and weight of evidence demonstrations:

	2007 8-Hr Ozone Design Values (ppb)	
CAAP Emission Reduction Strategies (Modeled)	SKIATOOK Base = 87.5	TULSA Base = 85.2
A. Removal of all emissions from expiring and non-renewed permitted sources	**87.3**	**85.0**
B. Tulsa Transportation Management Area (TMA) Transportation Improvement projects (roadway expansions and improvements)	Pending	Pending
C. Tulsa TMA Intelligent Transportation Systems (ITS) and Congestion Mitigation projects (intersection and signal improvements)	Pending	Pending
D. Tulsa TMA Transit and Commuter Option Reduction Strategy (modeled reductions)	Pending	Pending
Weight of Evidence Demonstrations (Non-Model Reductions)		
a. 7.8 RVP Gasoline in Tulsa TMA (85% market penetration on and on-road)	*87.2*	*84.9*
b. Environ Design Value (historical) trend analysis		
c. Quick Clearance Legislation		
d. Residential Low NOx water heaters		
e. Tulsa's Ozone Alert! Program		
f. Tulsa's Commuter Choice/RideShare /Trails Program		
g. Tulsa Area Clean Cities Program		

2) Remaining and additional modeling funding (ODEQ/ODOT/INCOG agreement) shall be used:

A. To enhance, improve and correct the CMAQ boundary conditions and update the 2002 NEI grid inventory in the current 1999 model episode

and;

B. For the development of a second photochemical ozone modeling demonstration which specifically targets and best meets Tulsa metro area conditions
(Second modeled episode estimate cost: $50,000 - $150,000)

3) An EAC Contingency Plan will be offered consisting of continued EAC planning and the above referenced modeling efforts. The contingency will offer a to-be-identified SIP mandated appropriate emission control strategy if the Tulsa Area should violate the ozone standard in 2004.

TULSA AREA CAAP
EMISSION REDUCTION STRATEGY RECOMMENDATIONS

To the Oklahoma Department of Environmental Quality
for Incorporation into the Oklahoma State Implementation Plan

INTRODUCTION

Tulsa has been long-recognized as a leader in local and proactive initiative for improving air quality. Over the past fourteen years since regaining attainment status just prior to the Clean Air Act revisions, the Tulsa Transportation Management Area (TTMA) has remained in attainment of the 1-hour National Ambient Air Quality Standard (NAAQS) for ozone. The Tulsa area is also meeting the revised 8-hour ozone standard and anticipates an April 15th, 2004 attainment designation based upon the revised 8-hour ozone NAAQS.

In committed effort to further ensure air quality improvement, the Tulsa area voluntarily opted into the 8-hour Ozone Early Action Compact in December of 2002. The EAC initiated and rapidly fueled aggressive development of a well-needed photochemical modeling database and modeled ozone episode for the Tulsa area.

It is important to note that EAC future-year modeling projections for the base-case 2007 emissions scenario indicate all Tulsa area monitors attaining the 8-hour ozone standard (2007 Skiatook DV of 80.0 ppb). Future-year attainment projection can be determined using the 2001-2003 current-year 8-hour design value. Although we acknowledge the perceived inconsistency in the language of the EPA draft guidance for 8-hour ozone modeling when defining current-year observed DV selection, we conclude that the 2001-2003 DV is consistent with the guidance and provides best current-year DV observation on which to scale future-year design value projections.

Local area governments, community and business leaders, environmental groups and concerned citizens in the TTMA remain committed to continued improvements in air quality to ensure clean air for the region. In this effort and in support of the EAC agreement, the following emission reduction strategies are recommended for incorporation into the Tulsa Area Clean Air Action Plan (CAAP):

TULSA AREA EMISSION REDUCTION STRATEGIES

A. <u>Removal of expiring and non-renewed permitted sources</u>

It was determined that a variety of expired and non-renewing permitted emission sources had been included in the 2007 ODEQ emissions inventory. Although not a typical control strategy, appropriately removing these emission sources from the inventory results in a direct reduction in 2007 future-year design value.

B. Tulsa Transportation Management Area - Transportation Improvement projects

TTMA planned roadway expansion and improvement projects are identified in the following:

1. The TTMA 2025 Mobility Plan for Roadways identifies an addition of 150 new expressway lane-miles and 715 new arterial lane-miles.

Approximately 20 million vehicle miles of travel (VMT) occur daily on the Tulsa TMA roadways. Arterials carry a major portion of the VMT at approximately 46% of the total. Table #1 below provides a comparison of roadway system characteristics forecasting 2025 growth and planned roadway projects.

Table #1; TTMA Roadway System Characteristics and Performance

	1995 (Base Year)	2025	Difference	Percent Change
Lane Miles				
Expressways	809	963	+154	+19.03%
Turnpikes	142	244	+102	+71.83%
Arterial Streets	7,453	8,168	+715	+9.60%
Total Lane Miles	8,404	9,375	+971	+11.55%
Travel				
Vehicle Miles/Day	18,928,000	25,299,770	+6,371,770	+33.66%
Vehicle Hours/Day	524,450	672,537	+148,087	+28.23%
Average Speed (mph)	36.09	37.62	+1.53	+4.24%

The plan shows completion of the expressway system with construction of the Gilcrease northwest loop, expansion of portions of the Broken Arrow Expressway and Mingo Valley Expressway to 8 lanes each, expanding Skelly Drive/I-44, and portions of US-75 S and US-75 N to 6 lanes each. Riverside parkway is identified as a special parkway to be designed and rebuilt to ensure safe passage for motorists, specifically where lane width and sight distance are inadequate. Numerous area arterials will additionally be expanded and are identified.

For the purpose of the Tulsa Area EAC analysis, TTMA linked-based Traffic Demand Modeling outputs were used to generate on-road mobile source emission estimates. In order to capture the emission reduction benefit due to the increase capacity and reduced congestion of those roadway projects planned through 2007, the Tulsa TMA long range transportation model has been modified to reflect such anticipated changes. The increased capacity in the model thru 2007 has yielded the link-based volumes and link-specific speeds to process with the Mobile 6.2 emission factors. The TTMA system as built will have significant benefits from the point of view of reduction in congestion as well as a reduction in pollution due to higher average speed on the roadway system.

Table #2 - 2025 Mobility Plan Roadway Improvements

(2025) Planned Roadway Improvements

Expressways		Existing or Committed Lanes	Proposed Lanes
Gilcrease Expressway	I-44 To Edison	New	4 Lanes
Gilcrease Expressway	Edison To Tisdale/Osage Expressway	New	2 Lanes
I-44	I-44/I-244 Junction To New Creek East Turnpike	4 Lanes	6 Lanes
I-44	I-244 To Yale Ave	4 Lanes	6 Lanes
MV Expressway (US 169)	I-244 To 86th Street N	4 Lanes	6 Lanes
MV Expressway (US 169)	91st Street S To Memorial Dr.	4 Lanes	6 Lanes
US-75 S.	I-44 To SH-117 (121st Street S)	4 Lanes	6 Lanes
US-75 N.	SH-11 (Gilcrease Expway) To 86th Street N	4 Lanes	6 Lanes
BA Expressway	I-44 To 161st E Ave	6 Lanes	8 Lanes
BA Expressway	193rd E Ave To Muskogee Turnpike	4 Lanes	6 Lanes
US-169 S	I-244 To 71st St S	6 Lanes	8 Lanes
Osage/Tisdale Expway	36th Street North To S.H. 20	New	2 Lanes

Arterials		Existing Or Committed Lanes	Proposed Lanes
S.H. 20	S.H. 97/Lake Rd To Lennapah (Skiatook)	2 Lanes	4 Lanes
S.H. 266	SH-167 To I-44 & New Will Rogers Tpk Entrance	2 Lanes	4 Lanes
S.H. 266 (Port Road)	E 36th St N. To Gilcrease Expressway (S.H. 11)	2 Lanes	4 Lanes
S.H. 266 (Port Road)	US 169 N. To Tulsa-Port Of Catoosa	2 Lanes	4 Lanes
S.H. 167	I-44 / US-412 To S.H. 266	2 Lanes	4 Lanes
S.H. 67 (151st Street S)	½ Mi. E Of US 75A To US 75 S	2 Lanes	4 Lanes
S.H. 97	103rd Street North To Existing SH-97	New	2 Lanes
S.H. 72	SH-51 To 151st Street South	2 Lanes	4 Lanes
Admiral	Garnett To 193rd E Ave	2 Lanes	4 Lanes
11th Street	I-44 To 145th E Ave	2 Lanes	4 Lanes
E 31st Street South	S Garnett Road To S 145th E Ave	2 Lanes	5 Lanes
E 41st Street South	S Garnett Road To S 145th E Ave	2 Lanes	5 Lanes
E 51st Street South	S 129th E Ave To S 145th E Ave	2 Lanes	5 Lanes
E 61st Street South	Riverside Parkway To South Harvard Ave	2 Lanes	4 Lanes
E 61st Street South	US-169 S To 161st E Avenue	2 Lanes	5 Lanes
E 61st Street South	161st E Ave To 177th E Ave	New	2 Lanes
E 61st Street South (Albany)	177th E Avenue To 193rd E Avenue	2 Lanes	4 Lanes
S Memorial Drive	I-44 To SH-67 (151st St S)	4 Lanes	6 Lanes
Us-64/S Memorial	E 161st St S To S Mingo Road	2 Lanes	4 Lanes
E Pine Street	Gilcrease Expway To US-169 N.	2 Lanes	5 Lanes
E 66th Street North	US-75 To Lakewood Avenue	2 Lanes	4 Lanes
E 76th Street North	Sheridan To Main Street In Owasso	2 Lanes	4 Lanes
E 76th Street North	US-169 To 129th Street In Owasso	2 Lanes	4 Lanes
E 86th Street North	US 75 N To N 145th E Avenue	2 Lanes	4 Lanes
E 96th Street North	Garnett Road To 129th E Ave	2 Lanes	4 Lanes
116th Street North	Garnett To US-169 N	2 Lanes	4 Lanes
N Sheridan	Apache To 36th Street N	2 Lanes	4 Lanes
N Yale Ave	E Pine Street To E Apache Street	2 Lanes	4 Lanes
N Yale Ave	66th St North To 76th St North	2 Lanes	4 Lanes
N Garnett Road	86th Street N To 116th Street N	2 Lanes	4 Lanes
129th E Ave	76th Street N To 106th Street N	2 Lanes	4 Lanes
E 81st Street South	¼ Mi. E Of S Lewis Ave To SH-51 (Broken Arrow)	2 Lanes	5 Lanes
E 81st Street South (Houston)	209th E Avenue To 225th E Avenue	2 Lanes	4 Lanes
E 91st Street South	Delaware To Mingo Road	2 Lanes	5 Lanes
E 91st St S (Washington St.)	US-169 S To S 193rd E Ave	2 Lanes	4 Lanes

Arterials		Existing Or Committed Lanes	Proposed Lanes
E 101st St South	Riverside Dr To SH-51	2 Lanes	4 Lanes
E 121st St South	Riverside Drive To 193rd E Ave	2 Lanes	4 Lanes
W 46th Street North	Cincinnati Ave To Proposed Osage Expway	2 Lanes	4 Lanes
W Pine Street	Union Ave To 25th W Ave/Gilcrease Museum Rd	2 Lanes	4 Lanes
W 71st Street	33rd W Ave To Union	2 Lanes	4 Lanes
W 61st Street	US-75 S To 49th W Ave	2 Lanes	4 Lanes
Lakewood Ave	66th Street North To 76th Street North	2 Lanes	4 Lanes
25th W Ave/Gilcrease Museum Rd	W Edison St To W Pine St	2 Lanes	4 Lanes
33rd W Ave	61st Street S To 71st Street S	2 Lanes	4 Lanes
49th W Ave	West Edison Street To Pine Street	2 Lanes	4 Lanes
49th W Ave	61st Street S To I-44	2 Lanes	4 Lanes
W 81st Street	49th W Ave To SH-66	2 Lanes	4 Lanes
W 96th Street South	Riverside Parkway To US 75 S	2 Lanes	4 Lanes
W 141st Street South	US-75 S To South Peoria Avenue	2 Lanes	4 Lanes
W 71st St South	US 75 S To Riverside Parkway	4 Lanes	6 Lanes
W 71st St South	S Union To US-75 S	2 Lanes	4 Lanes
S Union Ave	I-44 To West 71st. Street South	2 Lanes	4 Lanes
Lake Road (Osage County)	SH-20 To Lake Road At 126th St N	New	2 Lanes
S Peoria Ave	Creek Turnpike To W 131st St South	2 Lanes	5 Lanes
S Peoria Ave	61st Street South To Riverside Drive	2 Lanes	4 Lanes
S Delaware Ave	E 81st Street South To E 91st Street South	2 Lanes	4 Lanes
S Harvard Ave	E 61st Street South To E 91st Street South	2 Lanes	4 Lanes
S Yale Ave	Creek Expressway To 121st Street South	2 Lanes	4 Lanes
S Yale Ave	E 61st Street S To E 71st St S	2 Lanes	6 Lanes
S Yale Ave	E 81st Street S To Creek Expressway	2 Lanes	6 Lanes
S Sheridan Road	E 81st St South To 101st Street South	2 Lanes	5 Lanes
S Mingo Road	E 21st St South To 41st St S	2 Lanes	5 Lanes
S Mingo Road	E 71st Street To E 91st Street South	2 Lanes	4 Lanes
S Mingo Road	US-169 S To E 121st Street South	2 Lanes	4 Lanes
S Garnett Road	E Pine Street To E 21st Street South	2 Lanes	5 Lanes
S Garnett Road	E 51st Street To E 111th Street South	2 Lanes	5 Lanes
S 129th E Ave	E 21st Street South To E 121st Street South	2 Lanes	5 Lanes
161st E Ave	111th Street S To 131st Street S	2 Lanes	4 Lanes
S 177th E Ave (Lynn Lane/S. 9TH)	E 51st St S To BA Expway	2 Lanes	4 Lanes
S 177th E Ave (Lynn Lane/S. 9TH)	E 71st St S To E 101st St S	2 Lanes	4 Lanes
193rd E Ave (County Line)	I-44/US-412 To 61st Street S	2 Lanes	4 Lanes
193rd E Ave (County Line)	71st Street S To 101st Street S	2 Lanes	4 Lanes
S 145th E Ave	I-44 To E 41st Street South	2 Lanes	4 Lanes
S 145th E Ave	E 41st Street S To 71st Street S	4 Lanes	6 Lanes
S 145th E Ave (Aspen)	101st Street S To 121st Street S	2 Lanes	4 Lanes
Elwood (Glenpool)	141st Street To 151st Street S (SH-67)	2 Lanes	4 Lanes
12th Street (Sand Springs)	Adams Road To McKinley St.	2 Lanes	4 Lanes
McKinley Street (Sand Springs)	2nd Street To 12th Street	2 Lanes	4 Lanes
N 81st W Ave (Sand Springs)	S.H. 97 To North Road	New	2 Lanes

Parkways		Existing Or Committed Lanes	Proposed Lanes
Riverside Parkway	21st Street S To I-44	4 Lanes	4 Lanes
Riverside Parkway	I-44 To Creek Turnpike	4 Lanes	6 Lanes
Riverside Parkway	Creek Turnpike To E 121st Street South	New	4 Lanes

Bridges		Existing or Committed Lanes	Proposed Lanes
New Bridge On Yale	Connecting S Yale Ave To S Yale Place Across Arkansas River	New	4 Lanes

Table #3 - The TTMA Transportation Improvement Plan (TIP) 2003 – 2006

PIECE_TYPE	FACILITY	DESCRIPTION	COUNTY	LET_DATE	YEAR
BRIDGE	**186th Street North**	**0.103 Mile - Bridge Approach on 186th Street North over Skalall Creek, 3.3 miles West of US-74, North of Skiatook**	**TULSA**	**26-Sep-02**	**2003**
BRIDGE	**Bridge (Nickle Creek)**	**0.181 Kilometer - Bridge over Nickle Creek approximately 6.437 kilometer North and 4.828 kilometer East of Sapulpa**	**CREEK**	**20-Feb-03**	**2003**
BRIDGE	**County Bridge**	**Bridge and Approaches (#87) over Bird Creek on East 56th Street North, approximately 10 miles East of US-169(NBI#05043)**	**TULSA**		**2003**
BRIDGE	**County Bridge**	**Bridge over Delaware Creek**	**OSAGE**	**22-Aug-02**	**2003**
BRIDGE	**County Bridge**	**County Bridge over tributary to Broken Arrow Creek, 2.5 miles North & 6 miles West of Coweta**	**WAGONER**		**2003**
BRIDGE	**County Bridge (Cedar Creek)**	**0.139 Kilometer - Bridge Approach over Cedar Creek 4.828 Kilometers West and 1.770 Kilometers North of Coweta**	**WAGONER**	**25-Jul-02**	**2003**
BRIDGE	**I-244**	**0.00 Mile - Bridge Repair on I-244 over the Arkansas River**	**TULSA**	**23-Oct-03**	**2003**
BRIDGE	**I-244**	**Bridge Repair on I-244 Southbound over the Arkansas river**	**TULSA**	**24-Apr-03**	**2003**
BRIDGE	**Memorial Drive (US-64)**	**US-64 reconstruct bridge and approaches to 5 lanes over unnamed creek 6.35 miles south of US-169 (see (11186(04))**	**TULSA**		**2003**
BRIDGE	**US-169**	**Bridge and Approaches over 11th St and Admiral Pl (11031(09))**	**TULSA**		**2003**
BRIDGE	**US-169**	**0.00 Mile - Bridge Repair on US-169 Northbound ramp to I-244 Westbound**	**TULSA**	**25-Sep-03**	**2003**
BRIDGE	**County Bridge**	**Bridge and Approaches over Rock Creek on 20th Street West 1/4 mile north of 113th Street North**	**OSAGE**		**2004**
BRIDGE	**SH-151**	**Bridge Repair on Keystone Dam**	**TULSA**		**2004**
BRIDGE	**SH-266**	**Bridge Repair over SH-66**	**ROGERS**		**2004**
BRIDGE	**SH-66**	**0.160 Mile - Bridge Repair (Joint Seal) on SH-66 over the Verdigris River 3.8 miles North of 1-44 Junction**	**ROGERS**		**2004**
BRIDGE	**SH-66**	**0.160 Mile - Bridge Painting on SH-66 over the Verdigris River 3.8 miles North of 1-44 (both bridges)**	**ROGERS**		**2004**
BRIDGE	**US-64**	**Joint Seal Repair over Snake Creek, 10.4 mi South of Turnpike**	**TULSA**		**2004**
BRIDGE	**113th Street North**	**County Bridge Repair on 113th Street North & 52nd West**	**OSAGE**		**2005**
BRIDGE	**Bridge Projects (Various)**	**Small-scale Bridge Improvements; Paint, Seal Coat, Waterproofing, Silane, etc**	**TTMA**		**2005**
BRIDGE	**County Bridge**	**County Bridge #86 over Bird Creek Overflow, on 56th Street North, 0.7 mile East of US-169**	**TULSA**		**2005**

BRIDGE	County Bridge (NS414)	0.20 Mile - County Bridge and Approaches on NS414, 1.2 M. North of 71st Street	WAGONER		2005
BRIDGE	SH-97	ROW Acquisition for Bridge over Delaware Creek for project (13399(04), including overflow structure	OSAGE		2005
BRIDGE	SH-97	Utilities Relocation for Bridge over Delaware Creek for project (13399(04), including overflow structure	OSAGE		2005
BRIDGE	Bridge Projects (Various)	Small-scale Bridge Improvements; Paint, Seal Coat, Waterproofing, Silane, etc	TTMA		2006
BRIDGE	I-44	0.5 Mile - Reconstruct Yale Avenue Bridges "A" & "B" on I-44 to 6 lanes (06374(40)) BRIDGE AND APPROACHES	TULSA		2006
BRIDGE	Lewis Road	County bridge Repair app 1 mile north of SH-67	TULSA		2006
BRIDGE	Mingo Road/156th Street North	County Bridge Repair on Mingo Road at 156th Street North	TULSA		2006
BRIDGE	SH-20	0.118 Mile on SH-20 Bridge joint/seal repair over Verdigris River, 6.9 miles East of the Tulsa County line	ROGERS		2006
BRIDGE	SH-20	0.118 Mile on SH-20 Bridge painting over Verdigris River, 6.9 miles East of the Tulsa County line	ROGERS		2006
BRIDGE	191st & Mingo Road	County Bridge Approach	TULSA		
BRIDGE	Bird Creek	County Bridge	TULSA	18-Oct-01	
BRIDGE	Bridge Projects (Various)	Federal Aid 3B(Bridge) in conjunction with FHWA - preventative maintenance including Paint,Joints, Bearings and Deck repair	TTMA		
BRIDGE	Bridge Projects (Various)	Small-scale Bridge Improvements; Paint, Seal Coat, Waterproofing, Silane, etc	TTMA		
BRIDGE	Bridge Projects (Various)	Federal Aid 3B(Bridge) in conjunction with FHWA - preventative maintenance including Paint,Joints, Bearings and Deck repair	TTMA		
BRIDGE	Bridge Projects (Various)	Federal Aid 3B(Bridge) in conjunction with FHWA - preventative maintenance including Paint,Joints, Bearings and Deck repair	TTMA		
BRIDGE	Bridge Projects (Various)	Silane Treatment for bridge deck	TULSA	25-Apr-02	
BRIDGE	County Bridge (Billy Creek)	0.33 Kilometer - Bridge and Approach over Billy Creek 2.414 kilometers West & 6.276 kilometers North of Wagoner	WAGONER	27-Mar-03	
BRIDGE	County Bridge (NS408)	0.125 Mile - County Bridge on NS408 over Concharte Creek, 1 mile South and 0.75 mile West of Stone Bluff	WAGONER		
BRIDGE	County Bridge (Polecat Creek)	0.346 Kilometer - Bridge and Approach over Polecat Creek at 33rd West Avenue and 101st	TULSA	19-Oct-00	

BRIDGE	County Bridge (Spunky Creek)	0.20 Mile - Bridge and Approaches over Spunky Creek 1.8 mile North and 0.7 mile East of SH-66/I-44	ROGERS		
BRIDGE	County Bridge (Verdigris)	0.55 Kilometer - Bridge and Approach over the Verdigris River 8.529 kilometers North & 7.242 kilometers West of Claremore	ROGERS	16-Nov-00	
BRIDGE	I-244	Joint Seal	TULSA	26-Apr-01	
BRIDGE	I-244	Joint Seal	TULSA	24-May-01	
BRIDGE	I-244	Joint Seal Repair on I-244 at various locations in the City of Tulsa	TULSA	21-Mar-02	
BRIDGE	I-244	Bridge Painting over 23rd	TULSA	25-Apr-02	
BRIDGE	I-244	Bridge Painting on I-244 at various locations in the City of Tulsa	TULSA	21-Mar-02	
BRIDGE	I-44	0.3 Mile - Grade, Drain, Surface, Bridge over 31st Street and Memorial Road	TULSA		
BRIDGE	I-44	Bridge Repair	ROGERS	21-Mar-02	
BRIDGE	I-444	Bridge Repair	TULSA	18-Oct-01	
BRIDGE	SH-16	Bridge Painting over the Verdigris River 1.9 mile North of Muskogee Countyline	WAGONER	24-Mar-94	
BRIDGE	SH-51	Bridge Repair	TULSA	20-Jun-02	
BRIDGE	SH-66	0.331 Mile - Bridge and Approach on SH-66 for Bridge at Mossey Creek and unnamed Creek Southwest of Claremore (13400(04))	ROGERS		
BRIDGE	SH-66	Bridge and Approaches (Asphalt)	ROGERS		
BRIDGE	SH-97	0.208 Mile - Bridge on SH-97 over Delaware Creek and an unnamed creek	OSAGE		
BRIDGE	unknown	Bridge and Approaches	TULSA		
BRIDGE	unknown	Bridge Repair	TULSA		
BRIDGE	unknown	Bridge and Approaches	CREEK		
BRIDGE	unknown	Bridge and Approaches	TULSA		
BRIDGE	unknown	Joint Seal	TULSA		
BRIDGE	unknown	Bridge and Approaches	TULSA		
BRIDGE	unknown	Bridge and Approaches	TULSA		
BRIDGE	unknown	Bridge Repair	TULSA		
BRIDGE	unknown	Joint Seal	TULSA		
BRIDGE	US-169	0.029 Mile - Bridge Repair on US-169; Northbound over Pine Street to Repair Vehicle Impact Damage	TULSA	22-Jan-04	
BRIDGE	US-169	Silane Treatment for bridge decks at various locations	TULSA	25-May-00	
BRIDGE	US-64	0.0 Mile - Bridge Repair on 129TH West Avenue over US-64 (#7286-0699X)	TULSA	26-Feb-88	
BRIDGE	US-69	0.156 Mile - Bridge Redecking on US-69 over the Verdigris River North of Muskogee	WAGONER	26-Sep-02	
CONSTRUCTION	101st Street	Industrial Access: Begin at JCT 101st/Peoria in Jenks, Extend E & N to JCT 9th/B Street (OK Aquarium & Dept. Wildlife)	TULSA		2003

CONSTRUCTION	Arkansas River Parks Trail	West Bank Trail Phase 2 Construction from I-44 to 71st Street South	TULSA		2003
CONSTRUCTION	Cherry Creek Trail	Construction from Elwood Avenue to West 41st Street	TULSA		2003
CONSTRUCTION	County Road (NS-390)	0.075 Mile - Grade, Drain, Surface County Road (NS-390) approximately 1.3 miles North of Kiefer	CREEK	23-Jan-03	2003
CONSTRUCTION	Lake Skiatook Access Roads	Lake Access for Lake Skiatook: Begin on W 103rd Street 4.25 miles W of SH-11 extend West 2.0 miles and North 5 miles	OSAGE		2003
CONSTRUCTION	Memorial Drive (US-64)	1.713 Kilometer - Grade, Drain, Surface, Bridge US-64 from 151st Street to 161st Street in Bixby	TULSA	19-Dec-02	2003
CONSTRUCTION	SH-20	Claremore bypass on new alignment from interchange at SH-66 to I-44 (R/W for 18695(04))	ROGERS		2003
CONSTRUCTION	SH-66	Grade, Drain, Surface on SH-66; North of Catoosa to North of Foyil	ROGERS	27-Mar-03	2003
CONSTRUCTION	SH-66	From North of Claremore to 1.5 miles N of Foyle (Median Opening)	ROGERS		2003
CONSTRUCTION	Broken Arrow South Loop Trail Phase 2	Construction from 145th to 161st East Avenue	TULSA		2004
CONSTRUCTION	SH-51	Grade, Drain, Surface from east end of Salt Creek Bridge, extend east to 1/4 mile East of Tulsa county line	CREEK		2004
CONSTRUCTION	US-169	Reconstruct to widen to 6-lanes from I-44 to I-244 and 4th Place bridge and approaches	TULSA		2004
CONSTRUCTION	SH-20	Grade, Drain, Surface SH-20 from US-169 East 4.0 miles to East of 209th E Avenue (4 LANES)	TULSA		2005
CONSTRUCTION	SH-20	Grade, Drain, Surface SH-20 from app 2.6 mi East of SH-66 in Claremore East 18 mile	ROGERS		2005
CONSTRUCTION	2nd Street	Grade, Drain, Surface 2nd Street	TULSA		
CONSTRUCTION	41st Street	Grade, Drain, Surface, Bridge	TULSA	20-Jan-00	
CONSTRUCTION	61st Street	0.9240 Mile - Grade, Drain, Surface on 61st between Sheridan and Memorial (City of Tulsa)	TULSA	23-Apr-98	
CONSTRUCTION	71st (Kenosha)	2.888 Kilometer - Grade, Drain, Surface, Bridge East on 71st Street from Garnett Road	TULSA	22-Jul-99	
CONSTRUCTION	81st Street West	0.22 Mile - Grade, Drain, Surface, Bridge & Traffic Signals on 81st Street over I-44 near Sapulpa	CREEK	30-Apr-02	
CONSTRUCTION	Cemetery Road	Grade, Drain, Surface (Asphalt)	OSAGE		
CONSTRUCTION	County Road	0.30 Mile - Grade, Drain, Surface. Realign County Road and remove traffic from Railroad Bridge 0.9 mile South and 0.8 mile East of Bowden	CREEK		

CONSTRUCTION	County Road	1.71 Mile - Grade, Drain, Surface on County Road from 2 miles East of Tulsa county-line, extend North and West to NS-390	OSAGE		
CONSTRUCTION	County Road	0.206 Mile - Grade, Drain, Surface County Road (Hilton Rd) from 2.5 miles East and 1.5 miles North of Sapulpa, extend East and South	CREEK	26-Jun-03	
CONSTRUCTION	County Road (Sandy Creek)	0.274 Mile - Bridge Approach over the West Fork of Sandy Creek, 8 miles South and 1 mile East of SH-48/SH-16	CREEK	24-Jul-03	
CONSTRUCTION	I-244	2.30 Mile - Surface Wearing Course on I-244 East from US-75/I-244	TULSA	21-Feb-02	
CONSTRUCTION	I-44	0.163 Mile - Bridge Approach at 7 sites on I-44 betwee the Mingo Valley and I-244	TULSA	26-Jul-90	
CONSTRUCTION	I-44	Flame Straightening and Paint	ROGERS		
CONSTRUCTION	I-44	1.69 Mile - Grade, Drain, Surface on I-44 from 0.7 mile NorthEast of Broken Arrow to Mingo	TULSA		
CONSTRUCTION	I-44	0.889 Mile - Grade, Drain, Surface on I-44 from East of MKT RR to West of 31st in Tulsa	TULSA	23-May-02	
CONSTRUCTION	Midway Road	Grade, Drain, Surface, Bridge	WAGONER	23-Aug-01	
CONSTRUCTION	SH-20	1.733 Mile - Grade, Drain, Surface on SH-20 from 1.75 mile West of Osage/Tulsa county-line and extend East	OSAGE		
CONSTRUCTION	SH-20	3.9230 Mile - Grade, Drain, Surface, Bridge on SH-20 from 7.08 kilometer East of SH-20/SH-66 in Claremore and extend East	ROGERS	21-Oct-99	
CONSTRUCTION	SH-266	0.115 Mile - Grade, Drain, Surface, Bridge SH-266 East from SH-266/SH-66 to I-44	ROGERS	19-Oct-00	
CONSTRUCTION	SH-33	9.43 Kilometer - Grade, Drain, Surface, Bridge on SH-33 from 12 miles West of I-44/SH-33 and extend East	CREEK	26-Jul-01	
CONSTRUCTION	SH-51	6.791 Mile - Grade, Drain, Surface, Bridge East on SH-51 from 7.0 miles West of Wagoner	WAGONER		
CONSTRUCTION	SH-51	Grade, Drain, Surface, Bridge	TULSA		
CONSTRUCTION	SH-51	6.6 Kilometer - Grade, Drain, Surface, Bridge from 2.575 kilometer East of the Tulsa/Creek countyline and extend East	TULSA	19-Feb-98	
CONSTRUCTION	SH-51	7.184 Kilometer - Grade, Drain, Surface SH-51 from the existing 4 lane approximately 2.575 kilometer East of Creek county-line	TULSA	18-Nov-99	
CONSTRUCTION	SH-51	Grade, Drain, Surface	TULSA		
CONSTRUCTION	SH-51	1.051 Mile - Grade, Drain, Surface on SH-51 from US-169 and extend East	TULSA	22-Jun-00	
CONSTRUCTION	SH-51	1.416 Kilometer - Grade, Drain, Surface, Bridge on SH-51 from 2.25 kilometer East of SH-51/I-44 and extend East	TULSA	22-Apr-99	
CONSTRUCTION	SH-51	1.853 Mile - Grade, Drain, Surface, Bridge on SH-51 from Sheridan to West of Memorial including cross street at M.L. & BR.	TULSA	24-May-01	
CONSTRUCTION	SH-66	2.741 Mile - Grade, Drain, Surface, Bridge on SH-66 beginning at SH-66/SH-33 and extend East	CREEK		

CONSTRUCTION	SH-66	2.31 Mile - Grade, Drain, Surface SH-66 from 4 miles South and 3 miles West of SH-66/SH-28 in Chelsea	ROGERS	22-Feb-01	
CONSTRUCTION	SH-67	0.45 Mile - Grade, Drain, Surface on SH-67 beginning West of SH-67/US-75 then extend East	CREEK	20-Jan-00	
CONSTRUCTION	SH-67	2.285 Mile - Grade, Drain, Surface SH-67 from 0.5 mile East of US-75A in Kiefer to US-75	CREEK	25-Apr-02	
CONSTRUCTION	SH-88	4.60 Mile - Grade, Drain, Surface, Bridge SH-88 North from 3.5 miles Northwest of US-412	ROGERS		
CONSTRUCTION	SH-88	3.5 Mile - Grade, Drain, Surface, Bridge from US-412 and extend Northwest 3.5 miles	ROGERS		
CONSTRUCTION	SH-88	Grade, Drain, Surface	ROGERS	25-Jan-01	
CONSTRUCTION	SH-97	5.423 Kilometer - Grade, Drain, Surface from US-64/129th West Avenue in Sand Springs to SH-97 in Osage County	TULSA	19-Oct-00	
CONSTRUCTION	SH-99	1.041 Mile - Grade, Drain, Surface, Bridge SH-99; begin approximately 3.4 miles North of Hominy and extend North	OSAGE	25-Jul-02	
CONSTRUCTION	unknown	Grade, Drain, Surface, Bridge	CREEK		
CONSTRUCTION	unknown	Grade, Drain, Surface	TULSA		
CONSTRUCTION	unknown	Grade, Drain, Surface, Bridge	TULSA		
CONSTRUCTION	unknown	Grade, Drain, Surface, Bridge	TULSA		
CONSTRUCTION	unknown	Grade, Drain, Surface	TULSA		
CONSTRUCTION	unknown	Grade, Drain, Surface	TULSA		
CONSTRUCTION	unknown	Grade, Drain, Surface, Bridge	TULSA		
CONSTRUCTION	unknown	Grade, Drain, Surface, Bridge	TULSA		
CONSTRUCTION	unknown	Grade, Drain, Surface	TULSA		
CONSTRUCTION	unknown	Grade, Drain, Surface, Bridge	TULSA		
CONSTRUCTION	unknown	Grade, Drain, Surface, Bridge	WAGONER		
CONSTRUCTION	unknown	Grade, Drain, Surface, Bridge	WAGONER		
CONSTRUCTION	unknown	Grade, Drain, Surface and Signage	TULSA		
CONSTRUCTION	US-169	8.1715 Kilometer - Grade, Drain, Surface, Bridge US-169 from North of Oologah and extend North through Talala	ROGERS	20-Feb-03	
CONSTRUCTION	US-169	1.0464 KM. Grade, Drain, Surface, Bridge US-169 from 21st to I-44/21st Off-Ramp from I-44	TULSA	21-Mar-02	
CONSTRUCTION	US-51	8.1939 Kilometer - Grade, Drain, Surface, Bridge SH-51 from 2.5 miles West of the Turnpike and extend East	WAGONER	18-Oct-01	
CONSTRUCTION	US-75A	0.818 Mile - Bridge and Approach on US-75A over Duck Creek, 0.74 mile North of Okmulgee	CREEK	25-Sep-03	

GUARDRAIL	SH-20	Guardrail: SH-20 from west edge of Keetonville Hill, ext. East/SH-88 at Oologah Dam	ROGERS	24-Apr-03	2003
GUARDRAIL	I-244	Guardrail	TULSA	15-Nov-01	
GUARDRAIL	I-244	Guardrail on I-244 from Arkansas River to I-44 in Tulsa	TULSA	26-Jun-03	
INTERCHANGE	US-75	0.75 Kilometer - Grade, Drain, Surface on US-75 at US-75 & 8st Street	TULSA	23-Oct-03	2003
INTERCHANGE	US-75	Interchange improvements at US-75 and 71st Street	TULSA		2004
INTERCHANGE	US-75	0.75 Mile - Interchange on US-75 at US-75/111th Street South in Jenks	TULSA		2005
INTERCHANGE	Gilcrease Expressway	1.128 Kilometer - Grade, Drain, Surface, Bridge Interchange at US-75 & SH-11 (Gilcrease Expressway)	TULSA	25-Jan-01	
INTERCHANGE	I-244	0.19 Mile - Intersection Modifications on I-244 Entrance Ramp at Southwest Blvd	TULSA		
INTERSECTION	11th Street & South Elm	0.362 Mile - Intersection Modifications at 11th Street & South Elm in Jenks	TULSA	25-Jul-02	2003
INTERSECTION	81st Street (Houston)	Intersection reconstruction and widening at SH-51 and 81st street	WAGONER		2003
INTERSECTION	Elm Street	Intersection improvements, turn lanes, and signals at 121st Street	TULSA		2003
INTERSECTION	Nogales Street/Main Street	Intersection improvements, widening, and overlay at West Main Street	TULSA		2003
INTERSECTION	SH-167/SH-266	0.633 Mile - Intersection Modifications & Traffic Signals at SH-167/SH-266 at the Port of Catoosa	ROGERS	23-Oct-03	
INTERSECTION	US-169/76th Street North	0.34 Mile - Intersection Modifications at US-169/76th Street North in Owasso	TULSA	18-Oct-01	
RAILROAD	Railroad Projects (Various)	Railroad Crossing Protection Devices, Surfaces, Signage, Striping, Closures, etc	TTMA		2005
RAILROAD	Railroad Projects (Various)	Railroad Crossing Protection Devices, Surfaces, Signage, Striping, Closures, etc	TTMA		2006
RAILROAD	Railroad Projects (Various)	Railroad Crossing Protection Devices, Surfaces, Signage, Striping, Closures, etc	TTMA		
RESURFACE	Cherokee Street	Patching, widen, and overlay sections and add turn lanes from SH-167 (193rd St) to SH-66	ROGERS		2003
RESURFACE	Gilcrease Expressway	Phase 2 grading, drainage, and surfacing for a 4-lane expressway between US-75 and LL Tisdale Expressway	TULSA		2003
RESURFACE	US-64	7.16 Mile - Resurface NS104 East from 0.56 mile East of the Tulsa/Wagoner countyline to Haskell City Limits	WAGONER	25-Sep-03	2003

RESURFACE	Elwood Avenue	Pavement Resurfacing of Elwood Avenue From 151St to 131St	TULSA		2004
RESURFACE	I-244	1.412 Mile - Resurface Various Locations in the City of Tulsa	TULSA	20-Jun-02	
RESURFACE	I-244	Resurface various locations	TULSA	20-Jun-02	
RESURFACE	I-244	8.0 Mile - Resurface, Bridge Deck Repair on I-244 from East end of bridge over Peoria	TULSA	20-Jun-02	
RESURFACE	I-44	Resurface on I44/244	TULSA	30-Apr-02	
RESURFACE	I-44/US-64	7.0 Miles - Resurface I44 from Arkansas River/us-64 to 1.7 mile West of SH-97	TULSA	26-Jun-03	
RESURFACE	SH-11/US-60	19.20 Mile - Resurface on SH-11 East from the Kay county-line and East on US-60 from SH-99	OSAGE	22-Jan-04	
RESURFACE	SH-20	7.0 Mile - Resurface	ROGERS	25-Apr-02	
RESURFACE	SH-51	Resurface (Asphalt) SH-51	WAGONER	25-Jul-02	
RESURFACE	SH-66	Resurface	CREEK	21-Feb-02	
RESURFACE	SH-66	1.80 Mile - Resurface on SH-66 from SH-66/SH-97 to North and East	CREEK	26-Jun-03	
RESURFACE	SH-72	Resurface	WAGONER	21-Jun-01	
RESURFACE	SH-97	6.60 Mile - Asphalt Overlay	OSAGE	21-Feb-02	
RESURFACE	SH-97/SH-117	Resurface	TULSA	20-Jun-02	
RESURFACE	SH-99	3.70 Mile - Resurface OF SH-99 North from 1.7 miles North of SH-99/SH-33	CREEK	25-Sep-03	
RESURFACE	Sheridan Road	Widen & Resurface	TULSA	22-Jul-99	
RESURFACE	unknown	Resurface	CREEK		
RESURFACE	unknown	Resurface	ROGERS		
RESURFACE	unknown	Widen & Resurface	TULSA		
RESURFACE	unknown	Resurface (Asphalt) and Joint Repair	TULSA		
RESURFACE	US-169	Resurface	TULSA	20-Jun-02	
RESURFACE	US-60/SH-99	8.57 Mile - Resurface US-60/SH-99; North from SH-99/SH-11 (North of Wynona)	OSAGE	25-Sep-03	
ROW	Memorial Drive (US-64)	ROW Acquisition and utility relocation for widening to 6-lanes from Arkansas River to SH-67 (161st)	TULSA		2003
ROW	Right of Way Clearance	Line Item Placeholder for Projects to be Specified by ODOT	TTMA		2003
ROW	SH-51	From the East end of Salt Creek Bridge, ext. E. to 0.25 mi. E. of Tulsa C/L for parallel lane (ROW for 02224(04)	CREEK		2003
ROW	US-169	ROW Acquisition from I-44 to I-244	TULSA		2003
ROW	US-75	ROW for Interchange improvements at US-75 and 71st Street (12938(04))	TULSA		2003
ROW	US-75	ROW for Interchange: US 75 at 81st	TULSA		2003
ROW	Right of Way Clearance	Line Item Placeholder for Projects to be Specified by ODOT	TTMA		2004

ROW	SH-20	SH-20 from US-169 E 4 mi to Keetonville Hill near 209th E Ave [Right of Way Acquisition For project (09482(04)]	TULSA		2004
ROW	Right of Way Clearance	Demolition, Removal, Disposal of Obstructions prior to Utility Relocation or Project Startup	TTMA		2005
ROW	Right of Way Clearance	Demolition, Removal, Disposal of Obstructions prior to Utility Relocation or Project Startup	TTMA		2006
ROW	SH-66	0.331 Mile - ROW Acquisition on SH-66 for Bridge at Mossey Creek and unnamed Creek Southwest of Claremore (13400(04))	ROGERS		2006
ROW	SH-66	2.2 Mile - ROW Purchase for 4 lane construction on SH-66 from SH-117 to SH-97 (10157(04))	CREEK		2006
ROW	US-75	0.75 Mile - ROW Purchase on US-75 for Interchange at US-75 & 111th Street South in Jenks	TULSA		2006
ROW	I-44	1.10 Mile - ROW Purchase on I-44 at Harvard Avenue for 6-lane reconstruction	TULSA		
ROW	I-44	0.05 Mile - ROW Purchase on I-44 for 193rd Street Interchange (SH-167)	ROGERS		
ROW	I-44	1.10 Mile - ROW Purchase on I-44 at Harvard Avenue for Reconstruction to 6 lanes	TULSA		
ROW	I-44	1.10 Mile - ROW Purchase for ((06375(50)) on I-44 at Harvard Avenue for Reconstruction to 6 lanes	TULSA		
ROW	I-44	ROW Clearance	TULSA		
ROW	Memorial Drive (US-64)	ROW	TULSA	18-Oct-01	
ROW	Right of Way Clearance	Demolition, Removal, Disposal of Obstructions prior to Utility Relocation or Project Startup	TTMA		
ROW	SH-11	2.0 Mile - ROW Purchase on SH-11; from Barnsdall, extend Southeast approximately 2.0 miles	OSAGE		
ROW	SH-20	0.55 Mile - ROW Purchase on SH-20 for new alignment of SH-20 at SH-66	ROGERS		
ROW	SH-20	0.0 Mile - ROW Clearance along SH-20; Claremore bypass on new alignment from interchange at SH-66 to I-44	ROGERS	24-Jul-03	
ROW	SH-88	1.08 Mile - ROW Purchase on SH-88 from Will Rogers Memorial South to the SH-20 Claremore ByPass	ROGERS		
ROW	SH-88	3.56 Mile - ROW Purchase on SH-88 from 8.1 miles Northwest of US-412 into Claremore	ROGERS		
ROW	unknown	ROW Clearance	CREEK		
ROW	US-169	ROW Clearance	ROGERS		
SAFETY IMPROVEMENTS	Traffic Safety Projects	Small-scale Traffic Safety Improvements; Signals, Intersection Modifications, Lighting, Guardrails, Interconnect Systems, etc	TTMA		2005

SAFETY IMPROVEMENTS	Traffic Safety Projects	Small-scale Traffic Safety Improvements; Signals, Intersection Modifications, Lighting, Guardrails, Interconnect Systems, etc	TTMA		2006
SAFETY IMPROVEMENTS	Traffic Safety Projects	Small-scale Traffic Safety Improvements; Signals, Intersection Modifications, Lighting, Guardrails, Interconnect Systems, etc	TTMA		
SHOULDER	SH-51	Shoulder Repair	TULSA	21-Feb-02	
SIGNAGE	Traffic Safety Projects	Safety Improvements on I-244/US-169; deploy 7 overhead message sign bases at various locations in Tulsa	TULSA	17-Oct-02	2003
SIGNAGE	US-75	Signage Replacement on US-75 from I-244/US-75 North to SH-20	TULSA	17-Oct-02	2003
SIGNAGE	I-44	Signage	TULSA	18-Nov-99	
SIGNAGE	SH-51	Signage	TULSA	20-Jan-00	
SIGNAGE	SH-72	Signage - (School) on SH-72 (COWETA)	WAGONER		
SIGNAGE	unknown	Signage	TULSA		
SIGNAGE	US-169	Signage - (Traffic)	TULSA		
SIGNAGE	US-169	Signage	TULSA	22-Jun-00	
SIGNAGE	US-169	Signage - Overhead Sign Structure and sign Replacement on US-169 at SH-266 EXIT in Tulsa	TULSA	25-Sep-03	
TRAFFIC SIGNALS	SH-66/SH-33	Traffic Signals at SH-33/SH-66 West of downtown Sapulpa	CREEK	19-Dec-02	2003
TRAFFIC SIGNALS	Traffic Safety Projects	Line Item Placeholder for Projects to be Specified by ODOT	TTMA		2003
TRAFFIC SIGNALS	Mission Street	Traffic Signals 0.5 mi East of SH-117 & SH-97 Junction	CREEK		2004
TRAFFIC SIGNALS	Traffic Safety Projects	Line Item Placeholder for Projects to be Specified by ODOT	TTMA		2004
TRAFFIC SIGNALS	East 86th Street North	East 86th Street North at Mingo Rd - Intersection Modification & Traffic Signals in Owasso	TULSA		2005
TRAFFIC SIGNALS	East 86th Street North	East 86th Street North at N 145th E Ave - Intersection Modification & Traffic Signals in Owasso	TULSA		2005
TRAFFIC SIGNALS	71st Street & 129th East Avenue	Traffic Signals at 71st/129th in Broken Arrow	TULSA	25-May-00	
TRAFFIC SIGNALS	86th Street North	0.517 Mile - Intersection Modifications & Traffic Signals at 86TH ST N. from Dogwood to Main in Owasso	TULSA	20-Jun-02	
TRAFFIC SIGNALS	Elm Street/Main Street	0.516 Kilometer - Intersection Modifications & Traffic Signals at Elm Street/Main Street in Jenks	TULSA	21-Sep-00	
TRAFFIC SIGNALS	SH-88	0.00 Mile Traffic Signals at SH-88 and Blue Starr in the City of Claremore	ROGERS	20-Nov-03	

TRAFFIC SIGNALS	US-169	Traffic Signals on US-169 at US-169/SH-88	ROGERS	20-Dec-01	
TRAILS	Broken Arrow South Loop Trail Phase 3	Trail construction from 161st E. Avenue (Elm Street) to 101st Street South (New Orleans Street) NSU	TULSA		2003
TRAILS	Claremore Citywide Trail Phase 1	Design and Engineering for Claremore Citywide Trail Phase 1	ROGERS		2003
TRAILS	Osage Prairie Trail Project	Osage Prairie Trail Project (selected by OK Tourism and Recreation Dept)	TTMA		2003
TRAILS	Osage Trail	Design and Engineering from OSU Tulsa to 56th Street North	TULSA		2003
TRAILS	Trail Projects	Line Item Placeholder for Projects to be selected by OK Tourism and Recreation Dept	TTMA		2004
TRAILS	Trail Projects	Line Item Placeholder for Projects to be selected by OK Tourism and Recreation Dept	TTMA		2005
TRAILS	Trail Projects	Funding to be determined based on project selection by ODOT	TTMA		2006
TRAILS	Trail Projects	Line Item Placeholder for Projects to be selected by OK Tourism and Recreation Dept	TTMA		2006
TRAILS	Arkansas River Parks Trail	Bicycle and Pedestrian Trail Enhancement	TULSA	27-May-99	
TRAILS	Arkansas River Parks Trail	1.551 Mile - River Parks Trail Extension East from 11th Street to Tulsa / Sand Springs Trail	TULSA	23-Jul-98	
TRAILS	unknown	Bicycle and Pedestrian Trail	TULSA		
UTILITIES	I-44	Safety Improvements for Tulsa Metro; Communications for 7 DMS and Cameras	TULSA	22-May-03	2003
UTILITIES	SH-51	From the East end of Salt Creek Bridge, ext. E. to 0.25 mi. E. of Tulsa C/L for parallel lane (Utilities for 02224(04)	CREEK		2003
UTILITIES	US-169	Utilities Adjustment from I-44 to I-244	TULSA		2003
UTILITIES	US-75	Utilities for Interchange improvements at US-75 and 71st Street 12938(04)	TULSA		2003
UTILITIES	US-75	Utilities for Interchange US 75 at 81st	TULSA		2003
UTILITIES	SH-20	SH-20 from US-169 E 4 mi to Keetonville Hill near 209th E Ave [Relocation of Utilities for project (09482(04)]	TULSA		2004
UTILITIES	I-44	Clearance of Utilities on I-44 over Yale Avenue- Bridges A & B widen to 6 Lanes (06374(38))	TULSA		2005
UTILITIES	SH-66	0.331 Mile - Utilities Relocation on SH-66 for Bridge at Mossey Creek and unnamed Creek Southwest of Claremore (13400(04))	ROGERS		2006
UTILITIES	SH-66	2.2 Mile - Relocate Utilities for 4 lane construction on SH-66 from SH-117 to SH-97 (10157(04))	CREEK		2006

UTILITIES	**US-75**	**0.75 Mile - Utilities for Interchange on US-75 at US-75 & 111th Street South in Jenks**	**TULSA**		**2006**
UTILITIES	**I-44**	**1.10 Mile - Relocate Utilities on I-44 at Harvard Avenue for 6-lane reconstruction**	**TULSA**		
UTILITIES	**I-44**	**0.05 Mile - Relocate Utilities on I-44 for 193rd Street Interchange (SH-167)**	**ROGERS**		
UTILITIES	**SH-11**	**2.0 Mile - Relocate Utilities on SH-11; from Barnsdall, extend Southeast approximately 2.0 miles**	**OSAGE**		
UTILITIES	**SH-20**	**1.04 Mile - Relocate Utilities on SH-20 for Claremore ByPass realignment from SH-20/SH-66 to I-44**	**ROGERS**		
UTILITIES	**SH-20**	**0.55 Mile - Relocate Utilities on SH-20 for new alignment of SH-20 at SH-66**	**ROGERS**		
UTILITIES	**SH-88**	**3.56 Mile - Utilities Relocation on SH-88 from 8.1 miles Northwest of US-412 into Claremore**	**ROGERS**		
UTILITIES	**SH-88**	**1.08 Mile - Relocate Utilities on SH-88 from Will Rogers Memorial South to the SH-20 Claremore ByPass**	**ROGERS**		

C. <u>Tulsa TMA Congestion Mitigation Projects / Intelligent Transportation Systems (ITS)</u> projects (including intersection and signal improvements)

Traffic flow improvement programs involve traffic signal synchronization designed to minimize stop-and-go travel thereby shortening delays and increasing average route speeds. These projects are applicable primarily to arterial roads with many traffic lights. A research report from North Carolina State University (*Final Report – Emission Reduction Through Better Traffic Management, Frey, Nagui et al)* indicated that significant reductions in emissions were achieved when traffic flow was un-congested versus congested.

For the purpose of the Tulsa Area EAC analysis, estimated traffic flow improvement assumptions were made. TTMA transportation projects which facilitate travel and reduce congestion (and idle time) were identified from the Transportation Improvement Plan (TIP). In the absence of a transportation network micro-simulation, the impacts of intersection improvements were quantified using an off-modeled approach. Twenty major intersections related to signal coordination or intersection expansion were independently identified from the 2003 – 2006 TIP (Table #3). A fifteen (15%) percent reduction in idle time at each intersection was assumed. Mobile idle emission rates were used to estimate the daily emission reduction values using the total number of vehicles observed at each of the identified intersections.

As documented in the following project tables, intersection and signal projects Reductions in emissions achieved or predicted from the traffic flow improvement projects listed in the following tables:

Table #4

CITY OF TULSA, OKLAHOMA

TRANSPORTATION DESIGN PROJECTS STATUS REPORT

Printed: 3/31/2004

Total Active Projects: 69

		DESIGN		ROW		UTILITIES		CONSTRUCTION		
Project Description	Status	Compl Date	% Com.	Compl Date	% Com.	Compl Date	% Com.	NTP	Compl Date	% Com.
71st, Lewis to Florence Widen to 6 Lanes	Landscape Maint. - 97%	Sep-00	100%		100%		100%	May-99	Oct-02	100%
Harvard to Yale	Complete		100%		100%		100%	Jun-98	Jul-01	100%
Tisdale - Apache to 36th St. N.	See 6007-966125									
Riverside - 81st to 101st										
Phase I - 91st to 101st	Complete	Dec-95	100%		100%		100%	May-96	Apr-98	100%
Phase II - 81st to 91st	Complete	Nov-97	100%		100%		100%	Apr-98	Mar-00	100%
Landscaping	Landscape Maint. - 58%	Nov-01	100%		100%		100%	Mar-02	May-04	100%
81st and Sheridan Intersection	Complete	Mar-97	100%		100%		100%	Feb-00	Nov-00	100%
Widen 81st and Yale Intersection										
Street	Complete	Sep-95	100%		100%		100%	Feb-96	Jul-97	100%
Landscaping	Complete	Jan-99	100%		100%		100%	Feb-00	Oct-00	100%
Widen 129th E. Ave and 41st Intersection	Complete	Aug-97	100%		100%		100%	Jan-98	Aug-99	100%
Apache - Tisdale to Cincinnati	Complete	Jan-98	100%		100%		100%	Mar-98	Nov-99	100%
City Match-Widen Sheridan 61st -71st	Complete	Mar-98	100%		100%		100%	Nov-98	Mar-00	100%
Widen Sheridan - 71st to 81st	Complete	Dec-98	100%		100%		100%	Aug-99	Apr-01	100%
Widen Sheridan / B.A. Exp to 51st										
Phase I - 41st to 51st	Complete	Jan-95	100%		100%		100%	Mar-94	Dec-95	100%
Phase II - B.A. to 41st	Complete	Mar-96	100%		100%		100%	Mar-97	Jul-98	100%
Arterial Street - Major Rehabilitation	Complete	Oct-95	100%		N/A		N/A		Dec-02	98%
Residential Street - Major Rehabilitation	Complete		100%		N/A		N/A			100%
61st & Union Intersec. Engr. ROW	See 6007-966105									
TOTAL FUND 6003 INCOMPLETE PROJECTS										

CITY OF TULSA, OKLAHOMA

TRANSPORTATION DESIGN PROJECTS STATUS REPORT

Printed: 3/31/2004

Total Active Projects: 69

Project Description	Status	DESIGN Compl Date	DESIGN % Com.	ROW Compl Date	ROW % Com.	UTILITIES Compl Date	UTILITIES % Com.	CONSTRUCTION NTP	CONSTRUCTION Compl Date	CONSTRUCTION % Com.
Improve Peoria from Pine to Mohawk - ROW	**Complete**	**Jul-00**	**100%**		**100%**		**100%**	**Jan-01**	**Dec-02**	**100%**
Landscaping	**Execution**	**Jan-03**	**100%**		**N/A**		**100%**	**Feb-03**	**Jul-03**	**0%**
Yale - 91st St. to Creek Trnpk.- ROW	**See 6007 - 966113**									
91st and Sheridan Intersection - ROW	**Final Design**	**Jun-03**	**99%**		**3%**		**0%**			**0%**
129th E. Ave from 21st to 31st	**Construction**	**May-00**	**100%**		**100%**	**Apr-01**	**100%**	**Jul-01**	**Jan-03**	**100%**
91st and Mingo Intersection	**Construction**	**Apr-02**	**100%**	**Aug-01**	**100%**	**Jul-02**	**100%**	**Oct-02**	**Jul-03**	**100%**
Port Rd Extension - Partial ROW	**No Funds Available**	**Mar-01**	**100%**		**0%**					**0%**
Downtown Street & Sidewalk Improvements	**See 6008 - 014160**									
Becco 02-03 Street Cut										
Street Cut 03-04										
Sidewalk Improve. Arterial & Residential St	**Complete**		**100%**		**N/A**		**N/A**			**100%**
Downtown 2-Way Traffic Conversion	**See 6008 - 014160**									
Main Mall 3rd to 4th	**Complete Phase 1**	**Jun-00**	**100%**		**N/A**		**N/A**	**Jul-00**	**Apr-01**	**100%**
Fountain SE/C 4th and Main	**On Hold**	**Mar-02**	**100%**	**May-04**	**0%**		**N/A**	**Jun-03**	**Jul-04**	**0%**
Remainder of Main Mall	**Construction**	**Apr-03**	**100%**	**May-03**	**0%**		**N/A**	**Aug-03**	**Aug-04**	**0%**
Residential Streets Rehabilitation	**Construction**		**99%**		**N/A**		**N/A**			**98%**
Contract 11	**Complete**	**Apr-00**	**100%**		**N/A**		**N/A**	**Aug-00**	**Dec-01**	**100%**
Contract 13 Zones 3011, 4024	**Complete**	**Apr-00**	**100%**		**N/A**		**N/A**	**Apr-01**	**Apr-02**	**100%**
Contract 15A Zone 9036	**Complete**	**Jul-01**	**100%**		**N/A**		**N/A**	**Nov-01**	**Nov-02**	**100%**
Contract 15B Zone 2066 Garden City	**Complete**	**Nov-01**	**100%**		**N/A**		**N/A**	**Mar-02**	**Apr-03**	**100%**
Contract 16			**83%**		**N/A**		**N/A**			
Arterial Streets Rehabilitation	**Construction**		**100%**		**N/A**		**N/A**			**100%**
Contract G	**Complete**	**Nov-00**	**100%**		**N/A**		**N/A**	**Aug-01**	**Dec-01**	**100%**
Contract H	**Complete**	**Nov-00**	**100%**		**N/A**		**N/A**	**May-01**	**Jan-02**	**100%**
Contract L Phase 2	**Complete**	**Feb-01**	**100%**		**N/A**		**N/A**	**Jul-01**	**Nov-02**	**100%**

CITY OF TULSA, OKLAHOMA

TRANSPORTATION DESIGN PROJECTS STATUS REPORT

Printed: 3/31/2004

Total Active Projects: 69

		DESIGN		ROW		UTILITIES		CONSTRUCTION		
Project Description	Status	Compl Date	% Com.	Compl Date	% Com.	Compl Date	% Com.	NTP	Compl Date	% Com.
Contract M	**Complete**	**Sep-99**	**100%**		**N/A**		**N/A**	**Jan-00**	**Dec-01**	**100%**
Contract Q	**Complete**	**Apr-00**	**100%**		**N/A**		**N/A**	**Nov-00**	**Apr-02**	**100%**
Contract Q 3A								**Apr-03**	**Jun-03**	**100%**
Contract H Phase 2	**Complete**	**Feb-01**	**100%**		**N/A**		**N/A**	**Aug-01**	**Jan-02**	**100%**
Contract I Phase 2	**Complete**	**Jul-02**	**100%**		**N/A**		**N/A**	**Oct-02**	**Dec-02**	**100%**
Contract J	**Complete**	**Feb-01**	**100%**		**N/A**		**N/A**	**Oct-01**	**Oct-02**	**100%**
Contract L	**Complete**	**Mar-01**	**100%**		**N/A**		**N/A**	**Jul-01**	**Dec-01**	**100%**
Contract M incl. 36th St. N. & Harvard, Ph 2	**Complete**	**Mar-01**	**100%**		**N/A**		**N/A**	**Oct-01**	**Jul-02**	**100%**
Contract N	**Complete**	**Mar-01**	**100%**		**N/A**		**N/A**	**Jul-01**	**Dec-01**	**100%**
31st St. - Garnett to 129th Eng.	**On Hold - 2001 Funds**	**Aug-05**	**98%**	**Jan-06**	**0%**	**May-06**	**0%**	**Aug-06**	**Apr-07**	**0%**
61st Street - Riverside to Lewis Eng.										
Riverside to Peoria	**No Funds Available**	**Sep-05**	**100%**		**0%**		**0%**			**0%**
Peoria to Lewis	**No Funds Available**	**Jun-05**	**100%**		**0%**		**0%**			**0%**
61st St. & Union Intersection	**Complete**		**100%**		**100%**		**100%**	**Mar-00**	**Apr-01**	**100%**
71st - US 169 to Garnett	**Complete**	**Mar-00**	**100%**		**100%**		**100%**	**Jul-01**	**Aug-02**	**100%**
71st St. - Yale to 169	**Complete**		**100%**		**100%**		**100%**	**Dec-98**	**Mar-00**	**100%**
Yale to Sheridan Landscaping	**Landscape Maint. - 75%**	**Dec-99**	**100%**		**100%**		**100%**	**Aug-00**	**Aug-03**	**100%**
Sheridan to 101st Landscaping	**Landscape Maint. - 100%**	**Dec-98**	**100%**		**100%**		**100%**	**Mar-99**	**Aug-02**	**100%**
81st - Delaware to Harvard Eng.	**Final Design**	**Jul-03**	**95%**	**Dec-04**	**0%**	**Aug-05**	**0%**	**Oct-05**	**Jun-06**	**0%**
81st & Mingo Intersection Eng.	**Funding Scheduled in 2002**	**Jun-03**	**90%**	**Dec-04**	**0%**	**Aug-05**	**5%**	**Oct-05**	**Jun-06**	**0%**
91st & Harvard Intersection Eng.	**No Funds Available**	**Jul-00**	**100%**		**0%**		**0%**			**0%**
91st & Yale Intersection - ROW	**Final Design and R/W**	**Apr-03**	**99%**	**Jul-03**	**55%**	**Mar-04**	**0%**	**Jun-04**	**Aug-05**	**0%**
Garnett - 41st to 51st	**Complete**	**Apr-02**	**100%**		**100%**		**100%**	**Jul-00**	**Nov-01**	**100%**
Garnett - 51st to 61st ROW	**Final Design**	**Sep-03**	**85%**	**May-06**	**0%**	**Feb-07**	**0%**	**Apr-07**	**Dec-07**	**0%**

CITY OF TULSA, OKLAHOMA

TRANSPORTATION DESIGN PROJECTS STATUS REPORT

Printed: 3/31/2004

Total Active Projects: 69

		DESIGN		ROW		UTILITIES		CONSTRUCTION		
Project Description	Status	Compl Date	% Com.	Compl Date	% Com.	Compl Date	% Com.	NTP	Compl Date	% Com.
Garnett Widening - I-44 to 21st St.	**Complete**	**Mar-00**	**100%**		**100%**	**Apr-01**	**100%**	**Jul-01**	**Jul-02**	**100%**
Garnett & 11th Intersection Improvements	**Complete**	**Oct-97**	**100%**		**100%**		**100%**	**Mar-98**	**May-99**	**100%**
Gilcrease - 75 to Tisdale										
US 75 Interchange to Lewis Contract 2	**Construction**	**Jun-00**	**100%**	**Jun-02**	**100%**	**Sep-01**	**100%**	**Jun-01**	**May-03**	**96%**
Water & Sewer & Mohawk Contract 2A Ph 1	**Advertising**	**Jan-04**	**100%**		**99%**		**100%**	**Jun-03**	**Jul-04**	**0%**
Large Drainage Structures Contract 2A Ph 2	**Final Design**	**Apr-04**	**100%**		**99%**		**100%**	**Oct-03**	**Jul-04**	**0%**
Grading & Drainage Contract 2A Ph 3	**Final Design**	**Mar-05**	**95%**		**92%**		**90%**	**Aug-04**	**Aug-05**	**0%**
Bridges Contract 2B	**Final Design**	**Aug-05**	**95%**		**92%**		**90%**	**Aug-05**	**Jun-06**	**0%**
Paving Contract 2C	**Final Design**	**Mar-05**	**95%**		**92%**		**90%**	**Aug-05**	**Jun-06**	**0%**
Mitigation Plantings & Landscaping	**Preliminary Design**	**Aug-05**	**60%**		**92%**		**90%**	**Jun-06**	**Jan-07**	**0%**
Gilcrease Expry. Ext. from Tisdale Pkway	**Design/**	**Oct-03**	**75%**	**May-03**	**10%**		**0%**			**0%**
(Osage Expry) to 41st St. (Partial Eng. Only)*	**R/W**	**May-00**	**100%**		**N/A**		**N/A**			
Harvard - 91st to 101st Eng.	**Final Design**	**Aug-03**	**64%**		**0%**		**0%**			**0%**
Memorial - 61st to 71st Eng.	**No Funds Available**	**Feb-01**	**100%**		**0%**		**0%**			**0%**
Widen Mingo - 51st to 71st										
Mingo - 51st to 61st	**Complete**	**Nov-01**	**100%**	**Apr-01**	**100%**	**Jul-01**	**100%**	**Apr-02**	**May-03**	**100%**
Mingo - 61st to 71st	**Complete**		**100%**		**100%**		**100%**	**Sep-00**	**Nov-01**	**100%**
Tisdale - Apache to 36th St. N.	**Complete**	**Oct-01**	**100%**		**100%**		**100%**	**Feb-01**	**Mar-03**	**100%**
Phase II	**Construction**	**Dec-01**	**100%**		**100%**		**100%**	**Mar-03**	**Jan-04**	**24%**
ONG Relocation	**Complete**				**100%**		**N/A**			**100%**
Yale - 71st to 81st	**Final Design**	**Mar-03**	**98%**	**Jul-03**	**66%**	**Jul-04**	**0%**	**Nov-04**	**Nov-05**	**0%**
Yale - 81st to 91st Eng.	**Preliminary Design**	**Jun-03**	**90%**		**0%**		**0%**			**0%**
RR SW Blvd @38th & 3rd St W of Peoria	**Traffic Engr.**				**N/A**		**N/A**			**45%**

CITY OF TULSA, OKLAHOMA

TRANSPORTATION DESIGN PROJECTS STATUS REPORT

Printed: 3/31/2004

Total Active Projects: 69

		DESIGN		ROW		UTILITIES		CONSTRUCTION		
		Compl	%	Compl	%	Compl	%		Compl	%
Project Description	Status	Date	Com.	Date	Com.	Date	Com.	NTP	Date	Com.
Bridge Painting and Repair										
Painting	**Prework TBA**	**Dec-02**	**100%**	**May-03**	**N/A**	**Feb-04**	**N/A**	**Jun-03**	**Nov-03**	**10%**
Admiral & Mingo #156	**Complete**	**Dec-01**	**100%**		**N/A**		**N/A**			
Repair 248A, 248B, 261A, 261B, 301, 334	**Design / Constr.**	**May-02**	**80%**		**N/A**		**N/A**			
Bridge Replacement										
11th Street - Bridge 252	**Complete**	**Dec-01**	**100%**	**Jul-01**	**100%**	**Nov-01**	**100%**	**Jun-02**	**Jul-02**	**100%**
Mohawk - Bridge 213	**Complete**	**Mar-01**	**100%**		**100%**		**100%**	**Nov-01**	**Dec-02**	**100%**
TOTAL FUND 6007 INCOMPLETE PROJECTS										
71st - 93rd E. Ave. to Sheridan								**Jun-96**	**Sep-96**	**100%**
71st - Widen Sheridan To Memorial	**Complete**	**Mar-96**	**100%**		**100%**		**100%**	**May-97**	**Aug-98**	**100%**
71st - Widen Memorial to 93rd E. Ave.	**Complete**	**Dec-98**	**100%**		**100%**		**100%**	**Apr-95**	**Oct-95**	**100%**
Peoria - Pine to Mohawk Eng. & ROW	**See 6007-946020**									
Arterial Streets Rehab	**See 6007-966102**								**May-02**	**100%**
Non-Arterial Streets Rehab	**Complete**	**Dec-98**			**N/A**		**N/A**			**100%**
11th - Widen 129th - I-44	**Complete**	**Mar-00**	**100%**		**100%**	**Aug-01**	**100%**	**Jun-01**	**May-02**	**100%**
Improve Lewis - Admiral to 11th	**Complete**									
	See 6007-966124									
Yale - 91st to Creek Tpk. Engr.	**See 6007-966113**									
91st & Sheridan Intersection Engr.	**See 6007-946174**	**May-03**	**99%**							
129th E - 21st to 31st Engr.	**See 6007-946175**									
Garnett - 41st to 61st Engr.										
Garnett - 41st to 51st Engr., Phase I	**See 6007-966115**									
Garnett - 51st to 61st Engr., Phase II	**See 6007-966116**									

CITY OF TULSA, OKLAHOMA
TRANSPORTATION DESIGN PROJECTS STATUS REPORT
Printed: 3/31/2004

Total Active Projects: 69

		DESIGN		ROW		UTILITIES		CONSTRUCTION		
		Compl	%	Compl	%	Compl	%		Compl	%
Project Description	Status	Date	Com.	Date	Com.	Date	Com.	NTP	Date	Com.
91st & Mingo Intersection Engr.	**See 6007-946177**									
Port Rd Extension Engr.	**See 6007-946178**									
11th Street Corridor	**R/W**		**100%**		**50%**		**N/A**			
BOK - 71st Street Landscaping	**Hold**				**N/A**		**N/A**			
TOTAL FUNDS 6309 & 6310 INCOMPLETE PROJECTS										
91st Street - 169 to Garnett	**Final Design**	**May-03**	**100%**	**Jun-03**	**66%**	**Aug-03**	**0%**	**N/A**		**0%**
Res Street Rehab Zone 1001	**Complete**	**Jan-01**	**100%**		**N/A**		**N/A**	**May-01**	**Jun-02**	**100%**
Res Street Rehab Zone 1153	**Complete**	**Jun-00**	**100%**		**N/A**		**N/A**	**Sep-00**	**Jul-01**	**100%**
Res Street Rehab Zone 1156	**Awarding**	**Feb-03**	**98%**		**N/A**		**N/A**	**Jul-03**	**Jul-04**	**0%**
Res Street Rehab Zone 1070	**Complete**	**Jun-00**	**100%**		**N/A**		**N/A**	**Jan-01**	**May-02**	**100%**
Res Street Rehab Zone 1071	**Construction**	**Dec-02**	**100%**		**N/A**		**N/A**	**Jun-03**	**Nov-03**	**0%**
Res Street Rehab Zone 1076	**Construction**	**Dec-01**	**100%**		**N/A**		**N/A**	**Jun-02**	**May-03**	**100%**
Suburban Acres Drainage Improvements	**Award/Execution**		**0%**		**100%**		**N/A**	**Jul-03**	**Jul-04**	**0%**
Res Street Rehab Zone 1078	**Construction**	**Oct-01**	**100%**		**N/A**		**N/A**	**Feb-02**	**Mar-03**	**100%**
Res Street Rehab Zone 1079	**Complete**	**Jun-00**	**100%**		**N/A**		**N/A**	**Jan-01**	**May-02**	**100%**
Res Street Rehab Zone 2065-Ph I (East)	**Complete**	**Jan-01**	**100%**		**N/A**		**N/A**	**May-01**	**Mar-02**	**100%**
Res Street Rehab Zone 2065-Ph II (West)	**Awarding**	**Jan-03**	**98%**		**50%**		**100%**	**Jul-03**	**May-04**	**0%**
Res Street Rehab Zone 2066 West	**Complete**	**Jan-02**	**100%**		**N/A**		**N/A**	**Apr-02**	**Dec-02**	**100%**
Res Street Rehab Zone 2066 West-Ph II	**Awarding**	**Jun-03**	**90%**							
Res Street Rehab Zone 2067	**Construction**	**Jan-03**	**100%**		**N/A**		**N/A**	**Jun-03**	**Mar-04**	**11%**
Res Street Rehab Zone 3002-Ph II (West)	**Complete**	**Feb-01**	**100%**		**N/A**		**N/A**	**Aug-01**	**Dec-02**	**100%**
Res Street Rehab Zone 3002-Ph I (East)	**Complete**	**Feb-01**	**100%**		**N/A**		**N/A**	**Mar-01**	**Mar-02**	**100%**

CITY OF TULSA, OKLAHOMA

TRANSPORTATION DESIGN PROJECTS STATUS REPORT

Printed: 3/31/2004

Total Active Projects: 69

		DESIGN		ROW		UTILITIES		CONSTRUCTION		
		Compl	%	Compl	%	Compl	%		Compl	%
Project Description	Status	Date	Com.	Date	Com.	Date	Com.	NTP	Date	Com.
Res Street Rehab Zone 3003	**Construction**	**Oct-02**	**100%**		**N/A**		**N/A**	**Feb-03**	**Aug-03**	**76%**
Res Street Rehab Zone 3004	**Complete**	**Nov-01**	**100%**		**N/A**		**N/A**	**Apr-02**	**Apr-03**	**100%**
Res Street Rehab Zone 3072	**Construction**	**Apr-02**	**100%**		**N/A**		**N/A**	**Sep-02**	**May-03**	**100%**
Res Street Rehab Zone 3073	**Complete**	**Dec-01**	**100%**		**N/A**		**N/A**	**Jul-02**	**Jan-03**	**100%**
Res Street Rehab Zone 4013	**Complete**	**Feb-01**	**100%**		**N/A**		**N/A**	**May-01**	**Feb-02**	**100%**
Res Street Rehab Zone 4014	**Construction**	**Nov-02**	**100%**		**N/A**		**N/A**	**Apr-03**	**Mar-04**	**30%**
Res Street Rehab Zone 4021	**Complete**	**May-00**	**100%**		**N/A**		**N/A**	**Nov-00**	**Oct-01**	**100%**
Res Street Rehab Zone 4022	**Construction**	**Sep-02**	**100%**		**N/A**		**N/A**	**Feb-03**	**Mar-04**	**42%**
Res Street Rehab Zone 4032	**Complete**	**Oct-02**	**100%**		**N/A**		**N/A**	**Oct-01**	**Nov-02**	**100%**
Res Street Rehab Zone 4032 - Phase 2	**Advertising**	**Feb-03**	**95%**		**N/A**		**N/A**	**Jul-03**	**Jun-04**	**0%**
Res Street Rehab Zone 5026-Phase I SW	**Complete**	**Sep-01**	**100%**		**N/A**		**N/A**	**Jul-01**	**Apr-02**	**100%**
Res Street Rehab Zone 5026-Phase II NE	**Complete**	**Oct-01**	**100%**		**N/A**		**N/A**	**Feb-02**	**Feb-03**	**100%**
Res Street Rehab Zone 5026-Phase III NW	**Construction**	**Feb-03**	**100%**		**60%**		**5%**	**Jun-03**	**Nov-05**	**0%**
Res Street Rehab Zone 5032	**Complete**	**Feb-02**	**100%**		**N/A**		**N/A**	**Jun-02**	**Mar-03**	**100%**
Res Street Rehab Zone 6020	**Complete**	**Sep-01**	**100%**		**N/A**		**N/A**	**Feb-02**	**Nov-02**	**100%**
Res Street Rehab Zone 6035	**Complete**	**Oct-01**	**100%**		**N/A**		**N/A**	**Feb-02**	**Dec-02**	**100%**
Res Street Rehab Zone 6140	**Construction**	**Jan-03**	**100%**		**N/A**		**N/A**	**May-03**	**Mar-04**	**5%**
Res Street Rehab Zone 6042	**Construction**	**Jan-02**	**100%**		**N/A**		**N/A**	**Jul-02**	**Jul-03**	**64%**
Res Street Rehab Zone 6142	**Complete**	**Oct-01**	**100%**		**N/A**		**N/A**	**Feb-02**	**Dec-02**	**100%**
Res Street Rehab Zone 6144	**Complete**	**Sep-00**	**100%**		**N/A**		**N/A**	**Apr-01**	**Jan-02**	**100%**
Res Street Rehab Zone 6148	**Complete**	**Sep-00**	**100%**		**N/A**		**N/A**	**Apr-01**	**Jan-02**	**100%**
Res Street Rehab Zone 7032	**Complete**	**Feb-02**	**100%**		**50%**		**N/A**	**Jun-02**	**Mar-03**	**100%**
Res Street Rehab Zone 7038	**Construction**	**Nov-01**	**100%**		**N/A**		**N/A**	**Apr-02**	**Oct-03**	**100%**
Res Street Rehab Zone 7051	**Complete**	**Oct-01**	**100%**		**N/A**		**N/A**	**Mar-02**	**Nov-02**	**100%**
Res Street Rehab Zone 7052	**Complete**	**Nov-01**	**100%**		**N/A**		**N/A**	**Feb-02**	**Aug-02**	**100%**

CITY OF TULSA, OKLAHOMA

TRANSPORTATION DESIGN PROJECTS STATUS REPORT

Printed: 3/31/2004

Total Active Projects: 69

		DESIGN		ROW		UTILITIES		CONSTRUCTION		
Project Description	Status	Compl Date	% Com.	Compl Date	% Com.	Compl Date	% Com.	NTP	Compl Date	% Com.
Res Street Rehab Zone 7053-Phase I	**Complete**	**Oct-00**	**100%**		**N/A**		**N/A**	**Jul-01**	**Aug-02**	**100%**
Res Street Rehab Zone 7053-Phase II	**Complete**	**Oct-00**	**100%**		**N/A**		**N/A**	**Jul-01**	**Mar-02**	**100%**
Res Street Rehab Zone 7054	**Complete**	**Oct-01**	**100%**		**N/A**		**N/A**	**Feb-02**	**Aug-02**	**100%**
Res Street Rehab Zone 8113 Fry Ditch 2	**Complete**	**Feb-01**	**100%**		**N/A**		**N/A**	**Jul-01**	**Mar-02**	**100%**
Res Street Rehab Zone 8116-Phase I	**Complete**	**Apr-01**	**100%**		**N/A**		**N/A**	**Jun-01**	**Dec-02**	**100%**
Zone 8116-Phase II & 69th & Lewis	**Complete**	**Nov-01**	**100%**		**N/A**		**N/A**	**Apr-02**	**Apr-03**	**100%**
Zone 8116-Phase III, SA 99-1	**Complete**	**Jul-02**	**100%**					**Nov-02**	**Aug-03**	**93%**
Res Street Rehab Zone 9043-Phase I	**Complete**	**Jan-02**	**100%**		**N/A**		**N/A**	**Jun-02**	**Mar-03**	**100%**
Res Street Rehab Zone 9043-Phase II	**Award/Execution**	**Jan-03**	**100%**		**N/A**		**N/A**	**Jun-03**	**May-04**	**0%**
Res Street Rehab Zone 9056-PhaseI	**Complete**	**Sep-00**	**100%**		**N/A**		**N/A**	**Feb-01**	**Oct-01**	**100%**
Res Street Rehab Zone 9056-Phase II	**Complete**	**Sep-00**	**100%**		**N/A**		**N/A**	**Aug-01**	**Mar-02**	**100%**
Res Rd Prj Gen Eng/Insp Svc	**Construction**	**Apr-01**	**82%**		**N/A**		**N/A**			
TOTAL FUNDS 6311, 6312, 6313, 6314 INCOMPLETE PROJECTS										
15th and Utica Intersection	**Funding scheduled in 2004**	**Mar-06**	**0%**	**Jul-06**	**0%**	**Jan-07**	**0%**	**Mar-07**	**Feb-08**	
41st St. - Memorial to BA Expressway	**Construction ODOT**									
61st St. - 169 to Garnett	**Final Design**	**Dec-03**	**90%**	**Dec-03**	**0%**	**Jun-05**	**0%**	**Sep-04**	**Jul-06**	
129th E Av - 41st to 51st	**Preliminary Design**	**Oct-03**	**43%**	**Mar-04**	**0%**	**Dec-04**	**0%**	**Dec-04**	**Sep-05**	
Delaware - I244 to 11th	**Funding scheduled in 2003**	**Aug-04**	**0%**	**May-06**	**0%**	**Jan-07**	**0%**	**Mar-07**	**Jun-08**	
Lewis - 61st St to 75th St	**Funding scheduled in 2005**	**Jan-07**	**0%**	**Aug-08**	**0%**	**Jul-09**	**0%**	**Sep-09**	**May-11**	
Arterial Street - Major Rehabilitation										
11th St - Memorial to 89th E Av	**Awaiting Kick-off**	**Jan-04**	**0%**		**N/A**		**N/A**	**Mar-04**	**Jan-05**	
15th St - Fulton to Sheridan	**Execution**	**Mar-03**	**100%**		**N/A**		**N/A**	**Jun-03**	**Jan-04**	

CITY OF TULSA, OKLAHOMA
TRANSPORTATION DESIGN PROJECTS STATUS REPORT
Printed: 3/31/2004

Total Active Projects: 69

Project Description	Status	DESIGN Compl Date	DESIGN % Com.	ROW Compl Date	ROW % Com.	UTILITIES Compl Date	UTILITIES % Com.	CONSTRUCTION NTP	CONSTRUCTION Compl Date	CONSTRUCTION % Com.
15th St - Sheridan to 73rd E Ave.	Execution	Mar-03	100%		N/A		70%	Jun-03	Jan-04	
21st St - Harvard to Yale	Advertising	Jun-03	90%		20%		20%	Aug-03	Jul-04	
21st St - 129th E Av to 145th E Av	Funding scheduled in 2004	Dec-05	0%		N/A		N/A	Feb-06	Nov-06	
41st St- Yale to Hudson	Awaiting Kick-off	Jun-05	0%		N/A		N/A	Sep-05	Feb-07	
46th St N - Elwood to Cincinnati	Construction	Aug-02	100%		N/A		N/A	Feb-03	Jun-03	100%
51st St - 129th E Av to 145th E Av	Awaiting Kick-off	Dec-04	0%		N/A		N/A	Feb-05	Oct-05	
71st St - 33rd W Av to US75	Funding scheduled in 2005	Dec-05	0%		N/A		N/A	Feb-06	Dec-06	
81st St - Lewis to Riverside	Awaiting Kick-off	Dec-04	0%		N/A		N/A	Feb-05	Sep-05	
81st St - US169 to Garnett	Funding scheduled in 2005	Dec-05	0%		N/A		N/A	Feb-06	Aug-06	
161st - 11th to Admiral	Funding scheduled in 2005	Dec-05	0%		N/A		N/A	Feb-06	Sep-06	
Admiral - Yale to Memorial	Funding scheduled in 2004	Apr-05	0%		N/A		N/A	Jun-05	Jan-08	
Elwood - 71st to 81st	Funding scheduled in 2004	Dec-04	0%		N/A		N/A	Feb-05	Sep-05	
Garnett - Admiral Pl to I-244	Funding scheduled in 2006	Oct-06	0%		N/A		N/A	Dec-06	Apr-07	
Harvard - 36th St N to Mohawk	Construction	Aug-02	100%		N/A		N/A	Feb-03	Jun-03	100%
Independence - Lewis to Yale	Construction	Jul-02	100%		N/A		N/A	May-03	Feb-04	0%
Peoria - 21st to 31st	Awaiting Kick-off	Jun-05	0%		N/A		N/A	Sep-05	Sep-06	
Peoria - Admiral to Pine	Advertising	Apr-03	100%		N/A		0%	Sep-03	Sep-04	
Pine - Cincinnati to Main	Awaiting Kick-off	Sep-04	0%		N/A		N/A	Dec-04	May-05	
Yale - 14th to 21st	Advertising	Jun-03	95%		N/A		N/A	Aug-03	Jul-04	
Yale - I-44 to 41st	Awaiting Kick-off	Jan-05	0%		N/A		N/A	Sep-05	Feb-07	
Yale - 61st to 71st	Funding scheduled in 2004	Jun-05	0%		N/A		N/A	Sep-05	Dec-06	
Yale - 36th to 41st	Awaiting Kick-off	Jun-05	0%		N/A		N/A	Sep-05	Feb-07	

CITY OF TULSA, OKLAHOMA
TRANSPORTATION DESIGN PROJECTS STATUS REPORT
Printed: 3/31/2004

Total Active Projects: 69

Project Description	Status	DESIGN Compl Date	DESIGN % Com.	ROW Compl Date	ROW % Com.	UTILITIES Compl Date	UTILITIES % Com.	CONSTRUCTION NTP	CONSTRUCTION Compl Date	CONSTRUCTION % Com.
Downtown Streets and Sidewalks	**Mylar 8/15/03**	**Jun-03**	**62%**		**N/A**		**N/A**			
Phase 1 - Boston 3rd to 10th								**Sep-03**	**Sep-04**	
Phase 2 - 1st and 2nd - Boulder to Detroit										
Phase 3 - 8 blocks of 1st, 2nd, boulder, Cinc										
Phase 4 - 5 blocks of 3rd and 4th										
Traffic Signal Installation and Modification										
Arterial Street Sidewalks	**Construction**		**0%**		**N/A**		**N/A**		**Jun-03**	**35%**
Street Cut 03-04										
Pavement Management System Reinspection			**66%**		**N/A**		**N/A**			
Street Project Engineering and Inspection					**N/A**		**N/A**			
21st & 129th E Av	**Funding scheduled in 2005**	**Dec-05**	**0%**		**0%**		**0%**	**Feb-07**	**Aug-06**	
51st & 33rd W Av	**Funding scheduled in 2005**	**Dec-05**	**0%**		**0%**		**0%**	**Feb-07**	**Aug-06**	
Admiral & Yale Incl $100k LTL	**Preliminary Design**	**Dec-02**	**57%**		**0%**		**0%**	**Dec-03**	**Dec-03**	
Peoria & 36th St N	**Awaiting Kick-off**	**Dec-03**	**0%**		**0%**		**0%**	**Mar-04**	**Sep-04**	
Pine & Garnett	**Funding scheduled in 2005**	**Dec-05**	**0%**		**0%**		**0%**	**Mar-06**	**Sep-06**	
Pine & Lewis	**Construction**	**Jun-02**	**100%**		**0%**		**0%**	**Jan-03**	**May-03**	**99%**
Sheridan & Pine	**Funding scheduled in 2005**	**Dec-05**	**0%**		**0%**		**0%**	**Mar-06**	**Sep-06**	
Residential Street - Major Rehabilitation										
Res Street Rehab Zone 1001	**Awaiting Kick-off**		**0%**		**N/A**		**N/A**			
Res Street Rehab Zone 1007	**Awaiting Kick-off**		**0%**		**N/A**		**N/A**			
Res Street Rehab Zone 1068 Easton Heights	**Funding scheduled in 2003**	**Jun-04**	**0%**		**N/A**		**N/A**	**Aug-04**	**Jan-06**	
Res Street Rehab Zone 1068 Vern Sub West	**Construction**	**Nov-02**	**100%**		**N/A**		**N/A**	**Apr-03**	**Mar-04**	**30%**
Res Street Rehab Zone 1070	**Awaiting Kick-off**		**0%**		**N/A**		**N/A**			
Res Street Rehab Zone 1079	**Awaiting Kick-off**		**0%**		**N/A**		**N/A**			
Res Street Rehab Zone 2131	**Final Design / Right of Way**	**Jul-03**	**75%**		**N/A**		**N/A**	**Nov-03**	**Sep-03**	

CITY OF TULSA, OKLAHOMA
TRANSPORTATION DESIGN PROJECTS STATUS REPORT
Printed: 3/31/2004

Total Active Projects: 69

		DESIGN		ROW		UTILITIES		CONSTRUCTION		
		Compl	%	Compl	%	Compl	%		Compl	%
Project Description	Status	Date	Com.	Date	Com.	Date	Com.	NTP	Date	Com.
Res Street Rehab Zone 3009	**Construction**	**Jul-02**	**100%**		**N/A**		**N/A**	**Jan-03**	**Jul-03**	**93%**
Res Street Rehab Zone 3012	**Funding scheduled in 2004**	**Jun-05**	**0%**		**N/A**		**N/A**	**Aug-05**	**May-06**	
Res Street Rehab Zone 4013	**Funding scheduled in 2003**	**Jun-04**	**0%**		**N/A**		**N/A**	**Aug-04**	**Apr-06**	
Res Street Rehab Zone 4024	**Funding scheduled in 2005**	**Jun-06**	**0%**		**N/A**		**N/A**	**Aug-06**	**May-08**	
Res Street Rehab Zone 5033	**Funding scheduled in 2005**	**Jun-06**	**0%**		**N/A**		**N/A**	**Aug-06**	**Jul-08**	
Res Street Rehab Zone 5040	**Funding scheduled in 2004**	**Jun-05**	**0%**		**N/A**		**N/A**	**Aug-05**	**Apr-07**	
Res Street Rehab Zone 6019 Phase 1	**Awaiting Kick-off**	**Jun-05**	**0%**		**N/A**		**N/A**			
Res Street Rehab Zone 6019 Phase 2	**Funding scheduled in 2004**	**Jun-06**	**0%**		**N/A**		**N/A**	**Aug-06**	**Apr-08**	
Res Street Rehab Zone 7045	**Receiving Bids**	**Jul-03**	**99%**		**N/A**		**N/A**	**Aug-03**	**Apr-04**	
Res Street Rehab Zone 7058	**Awaiting Kick-off**		**0%**		**N/A**		**N/A**			
Res Street Rehab Zone 7059 South	**Awaiting Kick-off**	**Jun-04**	**0%**		**N/A**		**N/A**	**Sep-04**	**Feb-06**	
Res Street Rehab Zone 7059 North	**Awaiting Kick-off**	**Jun-04**	**0%**		**N/A**		**N/A**	**Sep-04**	**Feb-06**	
Res Street Rehab Zone 8057	**Final Design**	**Jul-03**	**95%**		**N/A**		**N/A**	**Sep-03**	**Nov-03**	
Res Street Rehab Zone 9037	**Funding scheduled in 2005**	**Jul-06**	**0%**		**N/A**		**N/A**	**Sep-06**	**Jan-08**	
Res Street Rehab Zone 9030	**Funding scheduled in 2004**	**Jun-04**	**0%**		**N/A**		**N/A**	**Sep-04**	**Mar-05**	
Res Neighborhood Traffic Calming Devices	**Traffic Engr.**									
Street Cut 03-04										
Res Street Sidewalks	**Construction**				**N/A**		**N/A**		**Jun-06**	
Street Cut 03-04										
Street Project Engineering and Inspection					**N/A**		**N/A**			
Pavement Management System Reinspection					**N/A**		**N/A**			
Bridge Repair Citywide										
Award/Execution	**Receiving Bids**	**Apr-03**	**100%**		**100%**		**75%**	**Jun-03**	**Mar-04**	
E Dawson @ ACME Brick #170	**Awaiting Kick-off**		**0%**		**N/A**		**N/A**			

CITY OF TULSA, OKLAHOMA

TRANSPORTATION DESIGN PROJECTS STATUS REPORT

Printed: 3/31/2004

Total Active Projects: 69

		DESIGN		ROW		UTILITIES		CONSTRUCTION		
		Compl	%	Compl	%	Compl	%		Compl	%
Project Description	Status	Date	Com.	Date	Com.	Date	Com.	NTP	Date	Com.
North Quebec @ Coal Creek #227	**Awaiting Kick-off**		**0%**		**N/A**		**N/A**			
11th & Mingo - 9400 E 11th # 248A	**Complete**	**Jul-02**	**100%**		**N/A**		**N/A**	**Sep-02**	**Jan-03**	**100%**
11th & Mingo - 9400 E 11th # 248B	**Complete**	**Jul-02**	**100%**		**N/A**		**N/A**	**Sep-02**	**Jan-03**	**35%**
S Hudson @ Lafortune Park # 353	**Construction**	**Dec-02**	**100%**		**N/A**		**N/A**	**Jun-03**	**Sep-03**	**100%**
1550 S 145th E Av # 332	**Final Design**	**Sep-03**	**90%**		**N/A**		**N/A**	**Sep-03**	**Feb-04**	
Bridge Replacement Citywide										
Admiral & Mingo #156	**Complete**	**Dec-01**	**100%**		**N/A**		**100%**	**Feb-02**	**Jun-02**	**100%**
Delaware @ 111th St S #175 (Funding 2004)	**Deck repair thru Street Cuts**	**Jun-05**	**0%**	**Jun-06**	**0%**	**Mar-07**	**0%**			
31st & Mingo with sidewalk	**Construction**	**Jul-02**	**100%**		**N/A**		**N/A**	**May-03**	**Nov-03**	**90%**
Street Surface and Crack Repair										
Arterial Crack Sealing Phase 1	**Construction**	**Feb-03**	**100%**		**N/A**		**N/A**	**Apr-03**	**Jul-03**	
Construction Inspection Services										
Non-Arterial Crack Sealing Phase 1	**Complete**	**Apr-02**	**100%**		**N/A**		**N/A**	**Sep-02**	**Apr-03**	**100%**
Non-Arterial Crack Sealing Phase 2	**Execution**	**Sep-02**	**100%**		**N/A**		**N/A**	**Jul-03**	**Oct-03**	
Arterial (Pothole) Surface			**0%**		**N/A**		**N/A**			
Street Cut 03-04										
Non-Arterial (Pothole) Surface			**0%**		**N/A**		**N/A**			
Main Mall Renovation	**See 6007-964109**									
Tulsa Trails Development										
General Trail Services			**47%**							
Midland Valley North Extension	**Preliminary Design**	**Mar-04**	**46%**		**15%**		**N/A**	**Jun-04**	**Jan-05**	
Mingo Trail - Memorial to 91st, 91st to 81st	**Final Design**	**May-03**	**90%**		**50%**		**N/A**	**Oct-03**	**Mar-04**	
West Bank Trail - Soccer Field to 51st	**Construction**	**Jul-01**	**100%**		**100%**		**N/A**	**Sep-02**	**Mar-03**	**99%**
West Bank Trail - 51st to 71st	**Final Design**	**Aug-01**	**99%**		**75%**		**N/A**	**Oct-03**	**Feb-04**	

CITY OF TULSA, OKLAHOMA

TRANSPORTATION DESIGN PROJECTS STATUS REPORT

Printed: 3/31/2004

Total Active Projects: 69

		DESIGN		ROW		UTILITIES		CONSTRUCTION		
		Compl	%	Compl	%	Compl	%		Compl	%
Project Description	Status	Date	Com.	Date	Com.	Date	Com.	NTP	Date	Com.
Zeigler Park Trail	**Construction**	**May-03**	**99%**		**N/A**		**N/A**	**May-03**	**Feb-04**	
Cherry Creek Trail	**Final Design**	**Jul-01**	**99%**		**20%**		**N/A**	**Oct-03**	**May-04**	
On-Street Bike Routes 5311-000014	**Final Design**	**Apr-03**	**100%**		**100%**		**N/A**	**Oct-03**	**Jan-04**	
Mingo Trail - 11th to 41st 6001-862310		**Jul-01**	**100%**	**Dec-02**	**100%**		**N/A**			
Phase 1	**Award/Execution**							**Jul-03**	**May-04**	
Phase 2 & 3	**Award/Execution**							**Aug-03**		
Future Match										
91st St & Yale Intersection	**See 6007-966113**									
31st St. - Garnett to 129th Eng.	**See 6007-966103**									
81st St & Delaware Intersection	**See 6007-966108**									
81st St & Mingo Intersection	**See 6007-966109**									
Garnett - 51st to 61st St	**See 6007-966116**									
Gilcrease Expressway: US75 to Tisdale	**See 6007-966119**									
Gilcrease Expressway: Tisdale to I-44	**See 6007-966120**									
TOTAL FUNDS 6008 INCOMPLETE PROJECTS										
***Difference paid by Federal and State Sources.**										
								COMPLETED PROJECTS		
City Match-Widen Delaware 91st to 96th		**Jun-94**						**Oct-94**	**Sep-96**	**100%**
								Mar-99	**Sep-99**	**100%**
Extend Tisdale Parkway (Osage Expry.) to 36th St. North		**May-95**						**Sep-95**	**Dec-96**	**100%**

CITY OF TULSA, OKLAHOMA
TRANSPORTATION DESIGN PROJECTS STATUS REPORT
Printed: 3/31/2004

Total Active Projects: 69

Project Description	Status	DESIGN Compl Date	DESIGN % Com.	ROW Compl Date	ROW % Com.	UTILITIES Compl Date	UTILITIES % Com.	CONSTRUCTION NTP	CONSTRUCTION Compl Date	CONSTRUCTION % Com.
Landscaping Package I		**Aug-97**	**100%**					**Dec-97**	**Jun-98**	**100%**
Landscaping Package II			**100%**					**Oct-97**	**Aug-98**	**100%**
Widen 51st & 129th E Ave Intersection		**Feb-96**	**100%**					**Sep-97**	**Oct-98**	**100%**
City Match to Widen Garnett-21st-31st		**Jul-95**	**100%**					**Jul-96**	**Oct-98**	**100%**
Widen Garnett - 31st to 41st		**Feb-97**	**100%**					**Jan-98**	**Mar-99**	**100%**
Riverside Drive-61st to 81st										

Table #5 Signal Accomplishments from July 1, 2003 to Present

PROJECT LOCATION	NEW/MODIFIED	COMMENTS	COMPLETE
51st & Memorial	Modified	State Farm Upgrade	August 15, 2003
17th & Garnett	Install Peds		August 19, 2003
Admiral Pl. & Lakewood	New Ped Signal		August 20, 2003
41st & Marion	Repair conduit	School signal	August 26, 2003
41st & Darlington	Install LT Heads		September 9, 2003
Pine & Peoria	Relocate cabinet		September 16, 2003
BA & Sheridan	Control cabinet	Change out cabinet - modernize controller	September 25, 2003
56th Pl. & Lewis	New Signals		October 24, 2003
121st & Delaware	Install Signals	Yellow Flasher above sign	October 28, 2003
21st & Utica	Cabinet changeout	21st Street corridor project	November 3, 2003
71st & Sheridan	Install Drainage	Install pullbox & repair conduit	December 2, 2003
Archer & Peoria	Run overhead	prepare for contractors	December 4, 2003
4th & Memorial	Add peds		January 7, 2004
21st St. Corridor	Install Radio System	Construction and radio system complete	February 26, 2004
91st & Garnett	Install Temporary signals		

Table #6 Traffic Signal Projects

New Traffic Signal Installations (TO BE COMPLETED IN FALL 2003)

Location	
East/West	**North/South**
E 8th St	S Elgin Av
US-412/US-64	Gilcrease Expwy
E 31st St	Riverside Dr
E 93rd St	S Memorial Dr
E 71st St	S Canton Av
E 41st St	S 102nd E Av
E 31st St	I-44 EB off/on ramp
E 55th Pl	S Mingo Rd
E 27th St (B.A. On Ramp)	S Harvard Av
E 91st St	S 101st E Av
E 66th	S Mingo Rd

Partial Repair of Existing Truss-Type, Green Pole & Arm, Traffic Signals

Location	
East/West	**North/South**
E 36 St N	S Harvard Av
E 46th St N	S Lewis Av
E 36th St	S Lewis Av
E 11th St	S 73rd E Av
E 15th St	S Peoria Av
E 21st St	S Cincinnati Av
E 6th St	S Utica Av
E 21st St	S Columbia Av
E 31st St	S New Haven Av
E 36th St	S Peoria Av

Tulsa TMA Transit and Commuter Option Reduction Strategy (modeled reductions)

Transit service in the TTMA consists of bus service provided by the Metropolitan Tulsa Transit Authority. Emission reductions are achievable through increased bus ridership, increased service routes, and park and ride program expansion. Additionally, INCOG provides commuter choice solution promotion through the Tulsa Area Commuter Choice Program. This strategy will be further researched, analyzed and defined in a later document.

CONTINUED MODELING PROGRESS AND NEW EPISODE DEVELOPMENT

Tulsa area CAAP recommendations include the critical need for continued modeling efforts to enhance, improve and correct the CMAQ boundary conditions and update the 2002 NEI grid inventory in the current 1999 model episode. A minimum of one or more additional ozone episode modeling demonstrations is recommended. The additional modeling episode demonstrations should specifically target the Tulsa area conditions.

AN EAC CONTINGENCY PLAN

An EAC Contingency Plan is a final recommendation, should the Tulsa area violate the ozone standard in 2004. This contingency is further defined in a separate section of this document.

V. Weight of Evidence

ENVIRON has provided an additional corroborative analysis as documented here to support the 2007 attainment demonstration.

EPA guidance allows for the use of a Weight of Evidence (WOE) attainment demonstration provided the modeled attainment test achieves a projected maximum 8-hour ozone DV that is less than 90 ppb. For the Oklahoma case, the maximum projected 8-hour ozone DV is 80.0 ppb (using 2001-2003 observed DVs) and 87.5 ppb (using 1998-2000 observed DVs) that are both below 90 ppb so therefore qualify for the WOE attainment demonstration approach.

The WOE attainment demonstration considers several additional modeled tests, trends in ozone air quality and emissions, receptor modeling and indicator species, quantifying uncertainties and other analysis. Below we discuss some of the modeling WOE attainment tests and trends in ambient ozone measurements and emissions.

Quantifying Uncertainties

The projected 2007 ozone Design Values are likely overstated because the modeling analysis failed to account for the large significant reductions in ozone and ozone precursors from outside the modeling domain. The boundary conditions (BCs) used in the 2007 modeling were based on a simulation of EPA's CMAQ model for an August 1999 base case emissions scenario. This simulation fails to account for numerous regional ozone control programs that EPA estimates will effectively reduce regional ozone and ozone transport, including:

- NOx SIP Call for large stationary sources;
- Tier 2/Low Sulfur rule for gasoline automobiles;
- Heavy Duty Diesel Rule for large trucks; and
- Land-based non-road engine standards.

The inclusion of these emissions reductions and their effects at reducing ozone and precursors entering the Oklahoma modeling domain (see Figure ES-1) in the 2007 Base Case modeling would result in lower future-year projected 8-hour ozone Design Values than calculated.

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

Using the observed 2001-2003 8-hour ozone 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 Tulsa (85.2 ppb) and Skiatook (87.5 ppb) monitors. 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 5 years of observed DVs from 1999 to 2003, which is shown in Table ES-2. Using 5 years of observed DVs, the modeled attainment test is passed in 4 out of the 5 years analyzed, suggesting that the observed 1998-2000 DVs are the atypical ones.

Table ES-2. Projected 2007 8-hour ozone Design Values (DVs) in Oklahoma for the 2007 Base Case emission scenario and five years of observed DVs from 1999 to 2003 (attainment demonstrated when project DV is 84.9 ppb or lower).

	Tulsa		Skiatook		OSDH	
Year	**Obs DV**	**2007 DV**	**Obs DV**	**2007 DV**	**Obs DV**	**2007 DV**
1997-1999	86	82.4	88	82.8	86	82.1
1998-2000	89	85.2	93	87.5	84	80.2
1999-2001	82	78.5	90	84.7	80	76.4
2000-2002	81	78.6	87	83.9	79	76.7
2001-2003	80	77.7	83	80.0	79	76.7

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 test indicates attainment (EPA, 1999, pg. 544-60). These tests measure how much the 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:

Grid-Hours > 84 ppb: 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.

Grid-Cells > 84 ppb: Compute the number of grid-cells in which the daily maximum 8-hour ozone concentrations is greater than 84 ppb.

Relative Difference (RD): 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 estimated 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). For the RD metric, an 80% reduction would be equivalent to a 0.20 value.

Table ES-3 below summarizes these metrics for the 1999 Base Case, 2007 Control Strategy 5, with the control measure not allowing already permitted sources to build, and Control Strategy 6, that also includes 7.8 RVP gasoline in the Tulsa TMA. Large reductions of 63% to 75% in all three modeling metrics are seen for the two 2007 strategies analyzed. Results for the 2007 Base Case and other 2007 strategies are similar. Although the reductions in the air quality metrics are not as large as the 80% suggested by EPA, the conservatisms in the model are likely masking larger reductions (e.g., if 2007 boundary conditions were used in the modeling reductions in the metrics would likely exceed 80%).

Table ES-3. Summary of additional modeling metrics recommended by EPA in a WOE determination.

	# Grid-Hours 8-hr > 84 ppb		# Grid-Cell > 84ppb		Relative Difference	
	(#)	(%)	(#)	(%)	(ppb-hr)	(%)
1999 Base	7551		2001			
2007 Cntl#5 Remove Permitted Sources	2359	69%	733	63%	0.26	74%
2007 Cntl#6 7.8 RVP in TTMA	2327	69%	723	64%	0.25	75%

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. EPA projects an 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. 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. Only sites with valid annual values in each year from 1995 – 2003 were included in the analysis. 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 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 ES-3. Trend slopes and statistical significance results are shown in Table ES-4. Significance test results indicate a non-zero slope at the 95% probability level. For the 1995 – 2003 period, there is a small downward (negative) trend in all cases except for a small upward (positive) trend at the Glenpool site in Tulsa. Maximum value and composite trends are below –1 ppb/year and are not statistically significant. For the 1998 – 2003 period, all of the trends are negative with values of –1.6 ppb/year or more. In Oklahoma City, both the maximum value and composite trends are statistically significant; only the composite trend is statistically significant for Tulsa.

Table ES-5 displays the trends in total NOx and VOC emissions in the Tulsa MSA. Anthropogenic emission totals are summarized for the 1999, 2000 and 2007 Base Case emission scenarios. 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 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 downwind. In particular, the recent downward trend in 8-hour ozone at the Tulsa (-2.77 ppb/year) and Skiatook (-2.31 ppb/year) monitors are quite substantial. These results, along with the downward trends in NOx and VOC emissions in the Tulsa MSA support the finding that Tulsa will be in attainment of the 8-hour ozone standard in 2007. **(ENVIRON, 2004)**

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

		Period			
		1995-2003		1998-2003	
City	Site	Linear trend (ppb/year)	Significant?	Linear trend (ppb/year)	Significant?
Oklahoma City					
	MOORE	-0.83	--	-2.94	--
	GOLDSBY	-0.05	--	-1.89	--
	OSDH	-0.75	--	-1.83	--
	EDMOND	-0.53	--	-0.63	--
	YUKON				
	CHOCTAW				
	Max Value	-0.70	NO	-2.03	YES
	Composite	-0.54	NO	-1.82	YES
Tulsa					
	TULSA[1]	-1.48	--	-2.77	--
	SKIATOOK	-0.95	--	-2.31	--
	GLENPOOL	-0.55	--	0.29	--
	KEYSTONE				
	LYNN LANE				
	MANNFORD				
	Max Value	-0.90	NO	-2.03	NO
	Composite	-0.99	NO	-1.60	YES

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

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

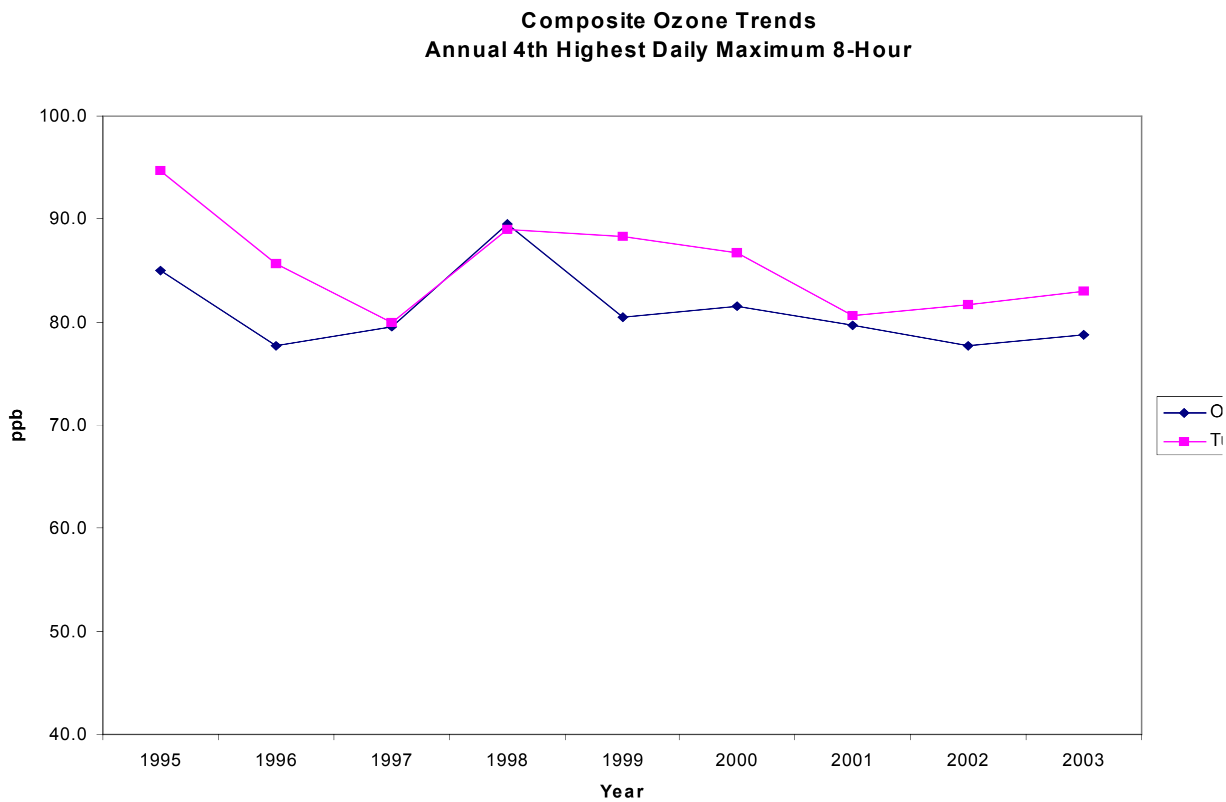


Figure ES-3. Composite trends in annual 4th highest daily maximum 8-hour ozone concentrations in Oklahoma City and Tulsa (based on monitoring sites with valid annual values for 1995 – 2003). **(ENVIRON, 2004)**

The following discussion describes additional corroborative analyses to be used by DEQ to support the 2007 attainment demonstration:

Modeling and EAC guidance requires use of worst-case scenarios

Metropolitan areas like Tulsa have several problems when they attempt to follow all of the rules and recommendations found in the *Protocol for Early Action Compacts designed to Achieve and Maintain the 8-hour Ozone Standard*, and *Draft Guidance on the use of Models and other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS*. The guidance provided by EPA on selecting an ozone episode in the draft Guidance, recommends selecting a full synoptic cycle (e.g.,10 – 21 days). The Tulsa metropolitan area currently has 5 ozone monitoring sites, of which, only one (Skiatook) has recorded a Design Value greater than 84 ppb in the last three years. Unlike many ozone non-attainment areas, Tulsa usually only has high ozone values for one or two days in a row in any 10 day timeframe. It is very unusual to have high ozone values for more than a few days in a 10 – 21 day synoptic cycle, so attempting to follow the guidance greatly limited the possible episodes that we could consider.

In the Protocol for EACs, the requirement that the episode must be 1999 or later, restricted DEQ to only consider the 4 ozone seasons of 1999 – 2002. In the model development, candidate episodes were selected, and ranked based on EPA selection criteria. The four best episodes and data for the Tulsa area ozone sites are listed below:

Rank	Time Period	No. of site-days > 84ppb	Skiatook No. of site-days > 84ppb
1	August 15-25, 1999 (11 days)	9	4
2	July 23 – August 8, 2001 (17 days)	10	2
3	August 6-10, 2002 (5 days)	6	2
4	September 1-4, 2001 (4 days)	6	0

The 08/15/99 episode was extended and 9 more site-days of >84ppb were added, 4 of which were at the Skiatook monitor.

Of the 4 episodes, only 2 meet the guidance of selecting a 10 – 21 day period, and since the 2001 episode was only good for the Tulsa area and not a useful episode for Oklahoma City, the 1999 episode we selected. DEQ was concerned about the Design Value for that year, but it was the only episode that passed all of the Guidance and EAC protocol requirements and met our needs.

DEQ believes that much of the Guidance was developed with Metropolitan areas (that record many more days of 8-hour ozone values of greater than 80ppb) in mind, and thus have many more episodes to select. The restrictions of the Protocol for the EACs compounded the problem, and forced DEQ to choose an episode from the year in which the highest design value in at least the last 10 years was recorded.

5-year design value as an alternative to the 3-year Design Value

DEQ believes that there is some merit in allowing areas to use a 5-year average for developing a design value. The 5-year averages would provide a much more stable value to work with. For example, at Skiatook, the site that sets the Design Value for Tulsa, the range of 5-year averages is very stable, from 86 to 89 ppb, compared to the 3-year average range for the same time period of 83 to 93 ppb. If DEQ was allowed to use a 5-year average instead of a 3-year average to calculate a design value, the value would be 89 ppb instead of the 10-year peak value of 93 ppb, and the current modeling would demonstrate attainment.

Ozone Monitoring trends

The design value trend for all of the Ozone monitors in Oklahoma is downward for the last 3 years. The design values for the Skiatook monitor for years 2000 through 2003 are 93, 90, 87, and 84ppb. We believe that some of the reduction is due to the weather pattern we have had for the last few years, but we also believe that a major portion of the reduction is due to the local and regional factors discussed below:

Tulsa NOx monitoring trends

Using the same metric as used for ozone (4^{th} highest 8 hour average), the average of the 2 NOx monitoring stations in the Tulsa area also has a downward trend. The trend values start in 1999 with a 39.5 ppb and end in 2003 with a 28 ppb.

Tulsa NOx and VOC Point Source emissions trends

The NOx emissions data verify the downward trend seen in the monitoring data. The emission trends for NOx for the three coal-fired power plants in the Tulsa area are downward. On average their emissions go from 12,236 tons per ozone season in 1997 to 11,300 tons per ozone season in 2002.

Only yearly values are available for all point sources. For all point sources in Tulsa county, there is a slight downward trend for NOx , but the trend for VOCs has a significant downward slope, starting in 1999 with 4961 TPY and ending in 2002 with 3636 TPY. This 28% decrease in Point source VOC emissions may have a significant impact on future modeling efforts.

Southern Oklahoma border ozone monitoring trends

The average of the 3 Southern Oklahoma border ozone monitoring sites range from 89.3 ppb in 1999 to 76 ppb in 2003. This monitoring data reflects the emission reductions achieved in Texas in recent years.

Tulsa DVMT
DVMT for the entire state has been growing at a rate of 2.22% per year, but for the Tulsa Urban area it has been growing at a rate of 1.62% per year for the last 7 years.

Congestion mitigation efforts

In Oklahoma, the capacity of most roadways has not been reached, and congestion is usually due to traffic accidents and construction that block one or more lanes, and impede the normal flow of traffic. These problems have been addressed recently by the Oklahoma State Legislature, and Oklahoma Department Of Transportation contracting practices.

Quick clearance law

The 2003 Oklahoma State legislature passed H. B. 1782, also known as the quick clearance bill. It can now be found in the Oklahoma Statutes, Title 47 Chapter 11 11-1001. This law took effect on November 1 2003, and requires motorist in non-injury accidents to move their vehicles off the road, before law enforcement and accident investigators arrive on the scene. The bill also empowers officers to move any abandoned vehicles that obstruct traffic flow.

ODOT road construction lane closure penalty clause and off peak bridge and ramp work requirements and Ozone Alert day response

Recently, ODOT has started inserting lane closure penalty clauses in some of their construction contracts, and have moved to scheduling ramp and bridgework to off peak hours in an effort to reduce traffic congestion. ODOT also has a Construction Control Directive (no. 990512) that addresses lane closures on Ozone Alert days. The Directive states that if an Ozone Alert day is issued, the ODOT Construction Engineer may direct the contractor to postpone a project and credit the contract for that day, unless the delay would be impractical or it would be impossible to reopen the lanes.

Exceptional Event request for September 1-3 of 2000

On November 30th 2000, the Oklahoma DEQ submitted an Exceptional event request to EPA Region VI. The request was for September 1-3 of 2000. EPA denied the request, resulting in the Skiatook monitor experiencing a 96 ppb 4th high value and a 93 ppb Design Value. If EPA had granted the Exceptional event request, the Skiatook monitor would have recorded an 88 ppb 4th high, and a 90 ppb Design value, which would result in the photochemical modeling demonstrating attainment.

V. Weight of Evidence (Continued) (Tulsa Area)

Prepared by The Indian Nations Council ofGovernments

7.8 RVP Gasoline in Tulsa TMA - lowering the Reid Vapor Pressure of 87 Octane Gasoline in the TTMA (85% market penetration on and on-road)

The Reid vapor pressure (RVP) of gasoline is indicative of the volatility of the fuel. The higher the RVP, the greater is the volatility. A reduction in the fuel RVP would reduce its volatility, resulting primarily in lower evaporative VOC emissions. This section summarizes the effects of reducing the fuel RVP to 7.8 psi in the year 2007 and the associated emissions reductions that can be achieved in the Tulsa EAC area.

The Tulsa EAC area currently has a federal RVP requirement of 9.0 psi. Local area gasoline suppliers have voluntarily agreed to provide an average of 7.8 RVP (or better) from 1 June through 15 September during ozone season. The on-road emission factor model, MOBILE6.2, was used to identify emissions reductions associated with lowering the fuel RVP. The MOBILE6.2 runs were done with an RVP of 7.8 psi for the ozone season for the analysis year 2007.

Table ES-6 of Section III of this document indicates a DV reduction at the monitors, even to bringing the modeled value at the Tulsa monitor below the standard. Further analysis will be provided in a later report, detailing emission tons/day.

Residential Low NOx water heaters

The Tulsa MSA is receiving emission reduction benefit from a near-100% market penetration of new low NOx residential water heaters at retail and commercial water heater vendors. Texas recently adopted a statewide rule as part of the Dallas/Fort Worth SIP revision requiring reduced nitrogen dioxide emissions from new natural gas-fired water heaters, small boilers and process heaters sold and installed in Texas beginning in 2002. The rule applies to each new water heater, boiler or process heater with a maximum rated capacity of up to 2.0 MMBtu/hr. The distribution of the low NOx water heaters, required by Texas state rule, has nearly or fully penetrated the Tulsa MSA market.

Tulsa Area Ozone Alert! Program

The Tulsa area Ozone Alert! program continues to be voluntary, broad based and extremely well supported in the Tulsa TMA. The 2004 ozone season will be the fourteenth season for this stellar voluntary program. A public opinion survey measurement tool recently randomly polled 500 telephone participants in a statically sound evaluation of the program.

December 2003 Telephone Public Opinion Survey of 500 Tulsa Area Residents Regarding Air Quality

These findings stem from a research project in which 500 randomly selected residents of the Tulsa metropolitan area were interviewed as to their awareness of and attitudes toward air quality in Tulsa, as well as toward Ozone Alert! Day suggested activities.

The survey finds that awareness of both Ozone Alert! Day and the encouraged actions for such designated days are very high.

A remarkable 80% of Tulsa residents say that they are familiar with the Ozone Alert! Day program. Even more amazing, however, is the education level of Tulsans as to what they can do to improve air quality. Fully 76% of Tulsans are able to provide an answer to this open-ended question - a very high percentage for this type of question where the respondent must create an answer rather than pick from a list. Most of these responses centered around the automobile, with 19% saying that they should carpool, while another 17% say they should drive less. Other items mentioned include not mowing (4%), gassing in the evening (2%) and observing the instructions of Ozone Alert! Days (9%).

When respondents are asked what specific actions they associate with Ozone Alert! Days, their high education level is again evident. Fully 67% volunteer that they are not to mow their lawns, 56% say they should carpool, 45% know that they should not "top-off" their gas tank, while more than 30% each know to utilize mass transit (38%), not to idle their car (36%), and to gas-up in the evening (33%). Clearly, Tulsa area residents know what actions they should (or should not) take during an Ozone Alert! Day.

Tulsans also believe that they already participate in Ozone Alert! Day activities. Fully 78% say that they undertook a specific action during the past summer as a result of an Ozone Alert! Day's being designated. Fully 56% say that they avoided mowing their lawn, while almost half (48%) did not top-off their gas tank. An additional 32% say that they gassed in the evening, while 29% said they reduced driving. Noticeably, only 15% say that they carpooled.

The Tulsa Area Ozone Alert! Program (WWW.OzoneAlert.Com) is multi-jurisdictional in scope and involving the entire TTMA. Elements of the *Ozone Alert! Program* include:

Ozone Alert! Day Pump Toppers. Nearly 100% of the TTMA gasoline retailers post "pump toppers" on *Ozone Alert! Days* requesting motorists not to refuel or wait until evening hours to do so.

Local Employers. The success of the *Ozone Alert! Program* is due in large part to the efforts of local employers. Tulsa area businesses have created *Ozone Alert! Program*s within their companies to encourage their employees to participate. These local business coordinators provide notice and information on reducing ozone-forming emissions to their organizations.

Ozone Alert! Fax and E-Mail Notification System. Several hundred local companies and organizations receive fax notification the afternoon before an *Ozone Alert! Day*. Thousands more subscribe to the OzoneAlert.Com E-Mail Alert! Notification. This number continues to grow each year.

Annual Ozone Alert! Season Kick-Off and Season-End Events. At the beginning and end of each ozone season, local employers and active program partners' kick-off the *Ozone Alert!* season with media events.

School Education. *Ozone Alert!* School Poster Contest is sponsored to educate students and their families about the *Ozone Alert! Program*. Educational materials about ozone formation and the *Ozone Alert! Program*, including an informational video, have been placed in faculty resource centers in public and private schools throughout the five county region to assist with air pollution education. An Ozone Alert! Video, "Charlie's Day," describing the Tulsa area's *Ozone Alert! Program* has been produced and distributed to local businesses and schools to aid in air quality education.

Other Program Elements.

- The Metropolitan Tulsa Transit System provides free bus rides on Ozone Alert days.
- All network TV meteorologists and many major radio stations provide Alert! day notice.
- Public messages among numerous strategies, include refraining from using their cars, but if they had to drive -- to use their newest vehicle, carpool, and fill up their tank at night.
- Company and Neighborhood Ozone Alert! Coordinator packets include information materials, signs and other aids to public message promotion.
- *The Ozone Alert! Program* Speaker's Bureau
- Overhead Highway Message Signage promotes Ozone Alert! Day notification
- Variable portable battery-operated message boards promote Alert! Day notification on arterial roads

- Web Site Outreach and Education through:

    - WWW.OzoneAlert.Com
    - WWW.TulsaCommuter.Com
    - WWW.TulsaCleanCities.Com

The Tulsa Area Clean Cities Program

The *Tulsa Area Clean Cities Program* was established in 1997, continuing Tulsa's commitment to clean air innovations. In addition to satisfying the FAR agreement initiative to develop a local "Clean Fuels Fleet", the Tulsa Area *Clean Cities* Program encourages and promotes the use of alternative fuels and alternative fueled vehicles. The overall goal of the Tulsa Clean Cities Program is to excite and unite fleet operators, fuel suppliers, vehicle manufacturers and dealerships, conversion facilities, maintenance facilities and public and private entities interested in expanding the alternative fuels and vehicle infrastructure. Another goal of the program is to partner with the successful *Ozone Alert! Program* in improving the air quality in the five county area through the reduction of hydrocarbons and other ozone-forming emissions.

A Public Fleet Conversion grant program, funded through a Tulsa Clean Cities CMAQ grant program, encourages programs that promote the conversion of vehicles to alternative fueled vehicles (AFVs), the purchase of original equipment manufacture vehicles (OEMs), and program and development of the alternative fueled vehicle infrastructure within the Tulsa area. These grants help ensure expansion of AFV's in the Tulsa area as well as provide incentive, visibility and recognition for area fleets adopting the clean vehicle philosophy in support of the Tulsa Area Clean Cities Coalition.

The Tulsa Area Clean Cities program currently lists 972 alternatively fueled vehicles in the Tulsa coalition. It is projected that there will be 1690 AFVs on the road in the Tulsa area in 2007.

The Tulsa Area Commuter Choice Program

Tulsa's Commuter Choice Program provides individuals, businesses and schools with information and resources needed to make transportation decisions alternative to taking the single occupant vehicle. Program elements include detailed RideShare/ Carpool matches from a Tulsa area database of commuters, bicycle route information and resources, Tulsa Transit information, and a School Pool Carpool program for parents and school aged children.

Through current activities such as carpooling and biking, the Tulsa Area RideShare program calculates the reduction of nearly 45,600 vehicle miles traveled. It is anticipated that the program will see a 20% increase in commuter participation each year. Through these activities, we estimate a reduction of 76,400 vehicle miles traveled by the year 2007.

REFERENCES

ENVIRON. 2004. "2007 Base Case and Control Strategy Photochemical Modeling for the Tulsa and Oklahoma City 8-Hour Ozone Early Action Compacts." Draft Report. Prepared for Oklahoma Department of Environmental Quality. March 25.

ENVIRON. 2003. "Meteorological Modeling of the August 1999 Episode to Support the 8-Hour Ozone Early Action Compacts for Tulsa and Oklahoma City." Interim Report. Prepared for Oklahoma Department of Environmental Quality. April 14.

ENVIRON. 2002. "Modeling Protocol – Development of a Photochemical Modeling Database to Address 8-Hour Ozone Attainment in the Tulsa and Oklahoma City Area." Draft Report. Prepared for Oklahoma Department of Environmental Quality. December.

EPA. 1991. "Guideline for Regulatory Application of the Urban Airshed Model." EPA-450/4-91-013, U.S. Environmental Protection Agency Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711. July 1991.

EPA. 1999. "Draft Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS". EPA-454/R-99-004. EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711. May 1999.

EPA. 2004a. "Technical Support Document for the Interstate Air Quality Rule: Air Quality Modeling Analysis", prepared by the EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC.

EPA. 2004b. "Air Quality Data Analysis Technical Support Document for the Proposed Interstate Air Quality Rule", prepared by the EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC.

Federal Register. 2004. 40 CFR Parts 51, 72, 75, and 96. Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (Interstate Air Quality Rule): Proposed Rule. Vol. 69, No. 20, pp. 4565-4650.

Jia Y. and R.E. Morris. 2003a. "Meteorological Modeling of the August 1999 Episode to Support the 8-Hour Ozone Early Action Compacts for Tulsa and Oklahoma City." Draft Final Report. Prepared for Oklahoma Department of Environmental Quality. August 29.

Jia Y. and R.E. Morris. 2003b. "Meteorological Modeling of the August 1999 Episode to Support the 8-Hour Ozone Early Action Compacts for Tulsa and Oklahoma City." Revised Draft Final Report. Prepared for Oklahoma Department of Environmental Quality. September 15.

Morris R.E., Y. Jia and E. Tai. 2003a. "Preliminary CAMx Base Case Modeling and Model Performance Evaluation for the Oklahoma August 1999 8-Hour Ozone Episode." Draft

Memorandum. Prepared for Oklahoma 8-Hour Ozone Early Action Compact Technical Advisory Committee. September 17.

Morris R.E., E. Tai and Y. Jia. 2003b. "Base Case Photochemical Modeling of the August 1999 Episode and Model Performance Evaluation to Support the 8-Hour Ozone Early Action Compacts for Tulsa and Oklahoma City." Draft Report. Prepared for Oklahoma 8-Hour Ozone Early Action Compact Technical Advisory Committee. December 22.

Texas Natural Resource Conservation Commission. 2002. "Protocol for Early Action Compact Designed to Achieve and Maintain the 8-hour Standard." As endorsed by EPA in the Regional Administrator's letter. June 19, 2002 and posted at http://www.epa.gov/eart1r6/6pd/air/pd-1/8_hour_ozone.pdf.

Department of Environmental Quality. 2004. TAC Meetings http://www.deq.state.ok.us/AQDnew/whatsnew/SIP/EAC.htm and http://www.deq.state.ok.us/AQDnew/whatsnew/SIP/MEETINGS.htm. March.

Attachments

ENVIRON

International Corporation Air Sciences

Draft Report

2007 Base Case and Control Strategy Photochemical Modeling for the Tulsa and Oklahoma City 8-Hour Ozone Early Action Compacts

Prepared for

Oklahoma Department of Environmental Quality
707 North Robinson
Oklahoma City, Oklahoma 73102

Prepared by

Ralph E. Morris
Edward Tai
Michele Jimenez
Cuong Tran
Yiqin Jia

ENVIRON International Corporation
101 Rowland Way
Novato, California 94945

March 25, 2004

TABLE OF CONTENTS

Page

TABLES

FIGURES

EXECUTIVE SUMMARY

Photochemical modeling was performed for Tulsa and Oklahoma City to evaluate alternative emissions control strategies and demonstrate attainment of the 8-hour ozone standard as part of the Oklahoma Early Action Compact (EAC). A photochemical modeling system consisting of the Version 5 of the Mesoscale Model (MM5), a nonhydrostatic prognostic meteorological model, Version 2x of the Emissions Processing System (EPS2x) and the Comprehensive Air-quality Model with extensions (CAMx) photochemical grid model was applied to a 20-day episode period of August 13 through September 1, 1999 during which elevated 8-hour ozone concentrations occurred in the Tulsa and Oklahoma City areas. The modeling system used a 36/12/4 km grid with the 36 km grid covering the Central States and the 4 km grid focused on Oklahoma (see Figure ES-1). The model was first exercised for a 1999 Base Case simulation and a model performance evaluation conducted to assess the accuracy of the model. The model was then exercised for 2002 and 2007 Base Case emission scenarios and several 2007 emission control strategies to assess attainment of the 8-hour ozone standard. The procedures used to apply the model followed EPA's guidance (EPA, 1991; 1999) and were documented in a Modeling Protocol that was developed at the outset of the Oklahoma EAC modeling process (ENVIRON, 2002).

MODEL PERFORMANCE EVALUATION

The MM5 simulation of the August 1999 episode was evaluated against observed surface and upper-air winds, temperature and humidity measurements using the routine monitoring network and the enhanced Oklahoma MESONET network. The MM5 model performance achieved model performance benchmarks on most days and was judged suitable for use in emissions and photochemical modeling (Jia and Morris, 2003a,b).

Emissions were generated for the 1999 Base Case simulation using EPS2x and the MM5 temperature estimates for the August 1999 episode. For states other than Texas, the 1999 National Emissions Inventory Version 3 (99NEI ver3) was the starting point for the area and point source emissions. The Texas Commission on Environmental Quality (TCEQ) provided 1999 emissions for the state of Texas. Day-specific NOx emissions for Electrical Generating Units (EGUs) in Oklahoma and Texas were prescribed using Continuous Emissions Monitoring (CEM) data from EPA's Acid Rain Database (ARD). On-road and off-road mobile source emissions were generated using EPA's MOBILE6 and NONROAD models, respectively. Link-based Vehicle Miles Traveled (VMT) data from local Traffic Demand Model (TDM) outputs were used in the Tulsa and Oklahoma City Transportation Management Areas (TMAs), whereas on-road mobile source emissions for Texas were generated by the Texas Transportation Institute (TTI). For the rest of the Oklahoma counties and states other than Texas, county-level Highway Performance Monitoring System (HPMS) VMT data along with MOBILE6 were used to generate the on-road mobile source emissions. Biogenic emissions were generated using the GLOBEIS model and day-specific temperatures from MM5.

The CAMx photochemical grid model was exercised for the August 13 through September 1, 1999 period for the 1999 Base Case emissions scenario using the MM5 meteorological fields and the resultant ozone estimates compared against available observations in a model performance evaluation. EPA guidance contains specific performance goals that photochemical models should mostly achieve before being used for projecting ozone attainment (EPA, 1991; 1999). The CAMx photochemical model achieved EPA's ozone model performance goals on most days of the August 1999 episode (Morris, Tai and Jia, 2003a,b). One of the most important EPA model performance goals is to predict the observed daily maximum 8-hour ozone concentration near the monitor at most monitors to within "20% (EPA, 1999). This goal is important because the maximum predicted daily maximum 8-hour ozone concentration near the monitors are what are used in the modeled ozone attainment demonstration test. Figure ES-2 displays a comparison of predicted and observed daily maximum 8-hour ozone concentrations using the maximum (Figure ES-2a) and nearest (Figure ES-2b) predicted value near the monitor. For the August 1999 episode, the maximum and nearest predicted daily maximum 8-hour ozone concentration near the monitor matched the observed daily maximum 8-hour ozone concentrations to within "20%, respectively, 84% and 96% of the monitor/days in the Oklahoma 4 km modeling domain thereby satisfying EPA's performance goal that predicted and observed 8-hour ozone pairs be within "20% at most monitors.

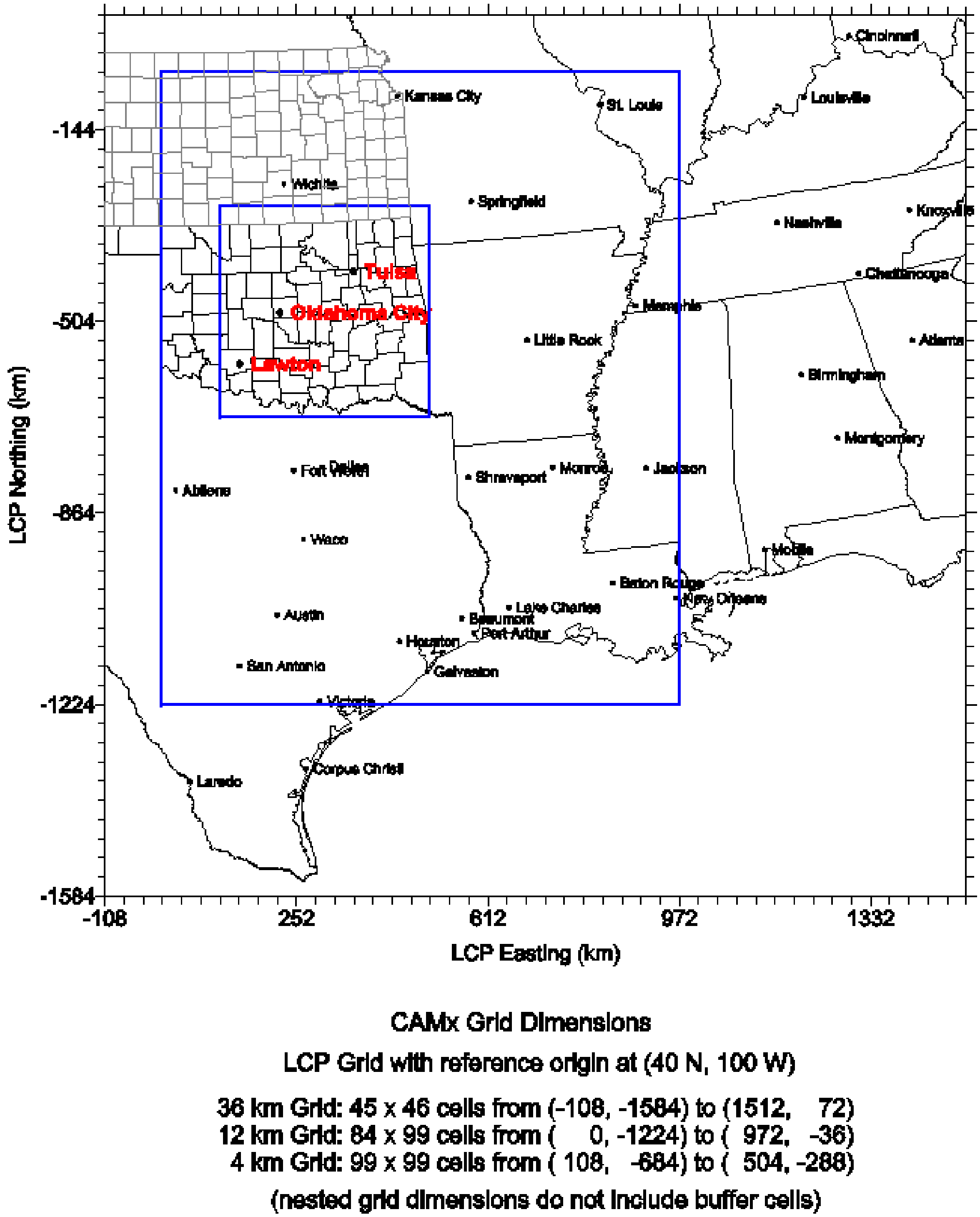


Figure ES-1. CAMx 36/12/4-km nested grids for Oklahoma 8-hour ozone EAC modeling.

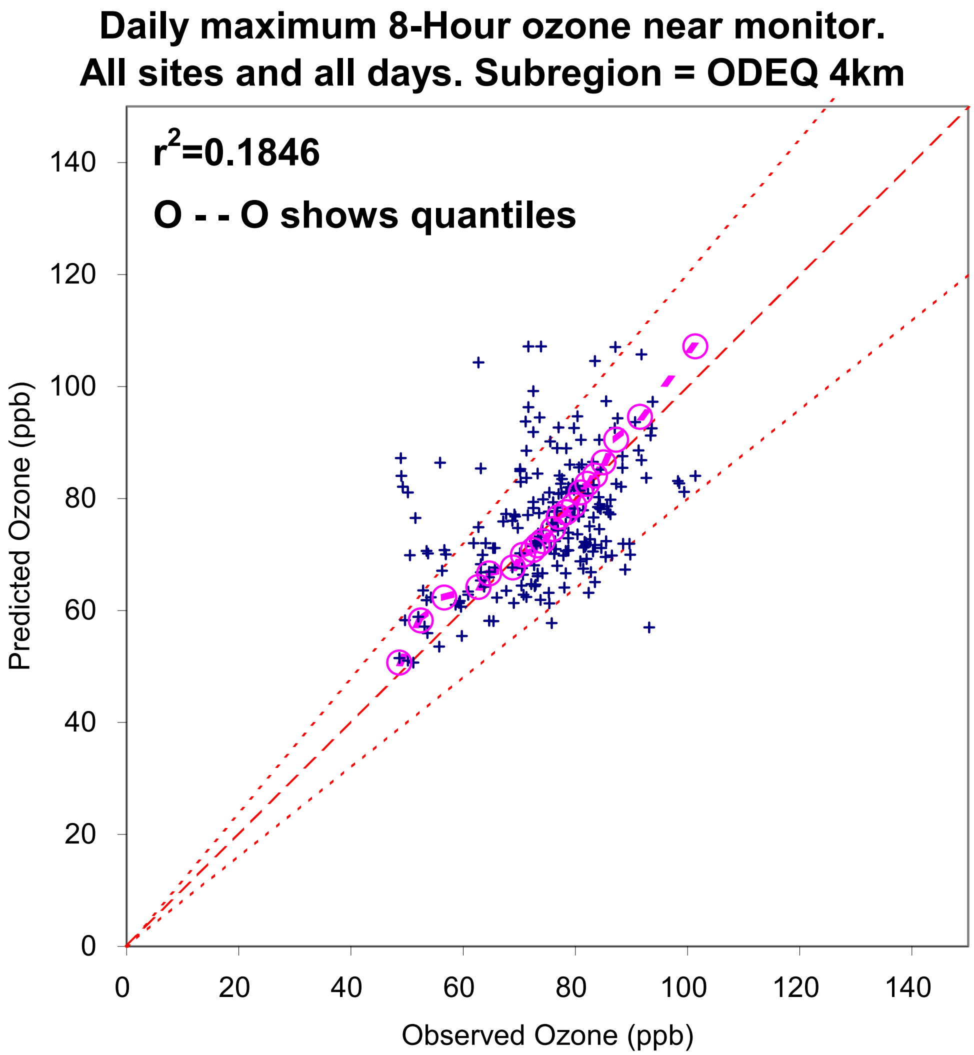


Figure ES-2a. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Oklahoma 4 km domain using the maximum estimated value near the monitor (± 20% indicated by dotted lines).

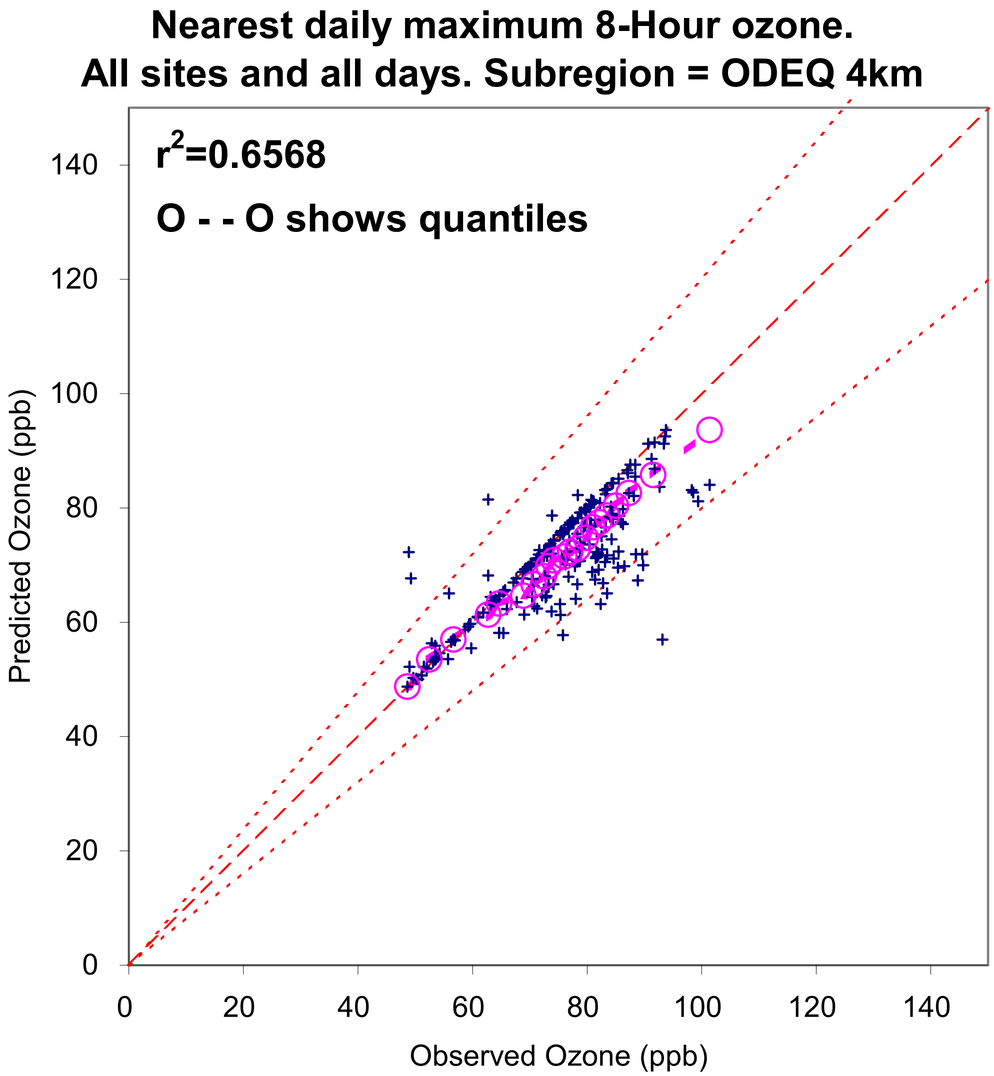


Figure ES-2b. Comparison of estimated and observed daily maximum 8-hour ozone concentrations across all monitors in the Oklahoma 4 km domain using the nearest estimated value near the monitor (± 20% indicated by dotted lines).

FUTURE-YEAR MODELING

2002 and 2007 Base Case Emission Scenarios

Emissions inputs were developed for a 2002 and a 2007 Base Case emissions scenario. Link-based VMT data for Tulsa and Oklahoma City were interpolated to the 2002 and 2007 years and MOBILE6 was used to generate on-road mobile source emissions. On-road mobile source emissions for Texas and 2002 and 2007 were provided by TTI. Outside of Texas and the two urban areas in Oklahoma, on-road mobile source emissions for 2002 and 2007 were based on EPA's Tier 2 analysis for the Tier 2/Low Sulfur Rule and the MOBILE6 model. Off-road mobile source emissions for 2002 and 2007 for states other than Texas were generated using EPA's NONROAD model, whereas the TCEQ generated the data for Texas. 2002 emissions for Electrical Generating Units (EGUs) were based on the average 3rd quarter of 2002 observed NOx emissions from EPA's Acid Rain Database (ARD). The EGU point source emissions for 2007 were based on EPA's projections used in their Heavy Duty Diesel Rule (HDDR). Outside of Texas, Non-EGU point sources for 2002 and 2007 were projected from the 1999 NEI, augmented with the State of Oklahoma providing specific new point sources from their permit database. TCEQ provided the non-EGU point sources for the 2002 and 2007 Base Case emission scenarios. Area sources were projected from the 1999 NEI inventory using projection factors from version 4.0 of the Economic Growth Analysis System (EGAS).

Procedures for Projecting Future Year 8-Hour Ozone Attainment

The EPA draft guidance for 8-hour ozone modeling has 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). EPA's procedures for projecting future-year 8-hour ozone Design Values starts with a current observed 8-hour ozone Design Value. 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 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 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 case of the Oklahoma application (EPA, 1999).

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 and 2002. 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) suggest that 2001-2003 observed Design Values should be used in the Oklahoma future-year Design Value projections. However, EPA Region VI has noted that one interpretation of criteria (a) "most recent available inventory" refers to the latest available version of the National Emissions Inventory (NEI) that is currently the 1999 NEI version 3, which implies that the observed 1998-2000 Design Values should be used. As further interpretation of EPA's 8-hour ozone modeling guidance on this issue we examined the recently published EPA's "Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (Interstate Air Quality Rule); Proposed Rule" (Federal Register, 2004). In the IAQR EPA projected the 1996 NET inventory to generate a 2001 Base Case emissions and then interpreted criteria (a) as implying that 2000-2002 8-hour ozone Design Values should be used in the Design Value projections based on having a 2001 Base Case emissions scenario available. This is almost exactly the same situation as faced by the Oklahoma EAC, only Oklahoma has a 2002 Base Case emissions inventory. To resolve the conflicting guidance from the EPA 8-hour modeling guidance (EPA, 1999), IAQR analysis (EPA, 2004) and statements from Region VI, we will calculated projected 2007 8-hour ozone Design Values using both the 1998-2000 and 2001-2003 observed Design Values. Note that for projecting 2007 Design Values using the 1998-2000 and 2001-2003 observed Design Values, current year base case simulations for 1999 and 2002, respectively, will be used.

2007 Projected 8-Hour Ozone Design Values in Oklahoma

The projected future-year 8-hour ozone Design Values (DVs) in Oklahoma for the 2007 Base Case emissions scenario using the observed 2001-2003 and 1998-2000 8-hour ozone DVs are shown in Table ES-1. The modeled attainment test is passed when the projected future-year 8-hour ozone DV is 84.9 ppb or lower. Using the 2001-2003 observed 8-hour ozone Design Values, all monitors in Oklahoma are modeled as attaining the 8-hour ozone standard with a maximum projected 8-hour ozone DV for the 2007 Base Case in Oklahoma of 80.0 ppb that occurs at the Skiatook monitor in Tulsa. However, using the observed 1998-2000 8-hour ozone Design Values the projected future-year 8-hour ozone DVs at the Tulsa (85.2 ppb) and Skiatook (87.5 ppb) monitors both exceed 85 ppb so do not pass the modeled attainment test. Thus, the modeled attainment test is inconclusive. Under these types of conditions where the modeled attainment test is close to the 8-hour ozone standard EPA guidance recommends that corroborative analysis be conducted and has procedures for conducting a Weight of Evidence (WOE) attainment demonstration.

Table ES-1. Projection of future-year 8-hour ozone Design Values in Tulsa, Oklahoma City and Lawton for the 2007 Base Case simulation using: (a) 2002/2007 modeling results and observed 2001-2003 Design Values; and (b) 1999/2007 modeling results and observed 1998-2000 Design Values.

Sites	Tulsa	Skiatook	Glenpool	OSDH	Moore	Goldsby	Lawton
(a) 2007 Design Value Projections using observed 2001-2003 8-Hour DVs							
2001-2003 DVs	*80*	*83*	*81*	*79*	*76*	*78*	*77*
2007 Base DV	77.7	80.0	78.5	76.7	73.8	75.9	74.7
(b) 2007 Design Value Projections using observed 1998-2000 8-Hour DVs							
1998-2000 DVs	*89*	*93*	*82*	*84*	*84*	*83*	*84*
2007 Base DV	85.2	87.5	77.8	80.2	80.2	79.2	79.5

Additional Corroborative Analysis

EPA guidance allows for the use of a Weight of Evidence (WOE) attainment demonstration provided the modeled attainment test achieves a projected maximum 8-hour ozone DV that is less than 90 ppb. For the Oklahoma case, the maximum projected 8-hour ozone DV is 80.0 ppb (using 2001-2003 observed DVs) and 87.5 ppb (using 1998-2000 observed DVs) that are both below 90 ppb so therefore qualify for the WOE attainment demonstration approach.

The WOE attainment demonstration considers several additional modeled tests, trends in ozone air quality and emissions, receptor modeling and indicator species, quantifying uncertainties and other analysis. Below we discuss some of the modeling WOE attainment tests and trends in ambient ozone measurements and emissions.

Quantifying Uncertainties

The projected 2007 ozone Design Values are likely overstated because the modeling analysis failed to account for the large significant reductions in ozone and ozone precursors from outside the modeling domain. The boundary conditions (BCs) used in the 2007 modeling were based on a simulation of EPA's CMAQ model for an August 1999 base case emissions scenario. This simulation fails to account for numerous regional ozone control programs that EPA estimates will effectively reduce regional ozone and ozone transport, including:

- NOx SIP Call for large stationary sources;
- Tier 2/Low Sulfur rule for gasoline automobiles;
- Heavy Duty Diesel Rule for large trucks; and
- Land-based non-road engine standards.

The inclusion of these emissions reductions and their effects at reducing ozone and precursors entering the Oklahoma modeling domain (see Figure ES-1) in the 2007 Base Case modeling would result in lower future-year projected 8-hour ozone Design Values than calculated.

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

Using the observed 2001-2003 8-hour ozone 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 Tulsa (85.2 ppb) and Skiatook (87.5 ppb) monitors. 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 5 years of observed DVs from 1999 to 2003, which is shown in Table ES-2. Using 5 years of observed DVs, the modeled attainment test is passed in 4 out of the 5 years analyzed, suggesting that the observed 1998-2000 DVs are the atypical ones.

Table ES-2. Projected 2007 8-hour ozone Design Values (DVs) in Oklahoma for the 2007 Base Case emission scenario and five years of observed DVs from 1999 to 2003 (attainment demonstrated when project DV is 84.9 ppb or lower).

	Tulsa		Skiatook		OSDH	
Year	**Obs DV**	**2007 DV**	**Obs DV**	**2007 DV**	**Obs DV**	**2007 DV**
1997-1999	86	82.4	88	82.8	86	82.1
1998-2000	89	85.2	93	87.5	84	80.2
1999-2001	82	78.5	90	84.7	80	76.4
2000-2002	81	78.6	87	83.9	79	76.7
2001-2003	80	77.7	83	80.0	79	76.7

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 test indicates attainment (EPA, 1999, pg. 544-60). These tests measure how much the 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:

Grid-Hours > 84 ppb: 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.

Grid-Cells > 84 ppb: Compute the number of grid-cells in which the daily maximum 8-hour ozone concentrations is greater than 84 ppb.

Relative Difference (RD): 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 estimated 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). For the RD metric, an 80% reduction would be equivalent to a 0.20 value.

Table ES-3 below summarizes these metrics for the 1999 Base Case, 2007 Control Strategy 5, with the control measure not allowing already permitted sources to build, and Control Strategy 6, that also includes 7.8 RVP gasoline in the Tulsa TMA. Large reductions of 63% to 75% in all three modeling metrics are seen for the two 2007 strategies analyzed. Results for the 2007 Base Case and other 2007 strategies are similar. Although the reductions in the air quality metrics are not as large as the 80% suggested by EPA, the conservatisms in the model are likely masking larger reductions (e.g., if 2007 boundary conditions were used in the modeling reductions in the metrics would likely exceed 80%).

Table ES-3. Summary of additional modeling metrics recommended by EPA in a WOE determination.

	# Grid-Hours 8-hr > 84 ppb		# Grid-Cell > 84ppb		Relative Difference	
	(#)	(%)	(#)	(%)	(ppb-hr)	(%)
1999 Base	7551		2001			
2007 Cntl#5 Remove Permitted Sources	2359	69%	733	63%	0.26	74%
2007 Cntl#6 7.8 RVP in TTMA	2327	69%	723	64%	0.25	75%

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. EPA projects an 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. 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. Only sites with valid annual values in each year from 1995 – 2003 were included in the analysis. 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 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 ES-3. Trend slopes and statistical significance results are shown in Table ES-4. Significance test results indicate a non-zero slope at the 95% probability level. For the 1995 – 2003 period, there is a small downward (negative) trend in all cases except for a small upward (positive) trend at the Glenpool site in Tulsa. Maximum value and composite trends are below –1 ppb/year and are not statistically significant. For the 1998 – 2003 period, all of the trends are negative with values of –1.6 ppb/year or more. In Oklahoma City, both the maximum value and composite trends are statistically significant; only the composite trend is statistically significant for Tulsa.

Table ES-5 displays the trends in total NOx and VOC emissions in the Tulsa MSA. Anthropogenic emission totals are summarized for the 1999, 2000 and 2007 Base Case emission scenarios. 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 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 downwind. In particular, the recent downward trend in 8-hour ozone at the Tulsa (-2.77 ppb/year) and Skiatook (-2.31 ppb/year) monitors are quite substantial. These results, along with the downward trends in NOx and VOC emissions in the Tulsa MSA support the finding that Tulsa will be in attainment of the 8-hour ozone standard in 2007.

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

		Period			
		1995-2003		1998-2003	
City	**Site**	**Linear trend (ppb/year)**	**Significant?[1]**	**Linear trend (ppb/year)**	**Significant?**
Oklahoma City					
	MOORE	-0.83	--	-2.94	--
	GOLDSBY	-0.05	--	-1.89	--
	OSDH	-0.75	--	-1.83	--
	EDMOND	-0.53	--	-0.63	--
	YUKON				
	CHOCTAW				
	Max Value	-0.70	NO	-2.03	YES
	Composite	-0.54	NO	-1.82	YES
Tulsa					
	TULSA[2]	-1.48	--	-2.77	--
	SKIATOOK	-0.95	--	-2.31	--
	GLENPOOL	-0.55	--	0.29	--
	KEYSTONE				
	LYNN LANE				
	MANNFORD				
	Max Value	-0.90	NO	-2.03	NO
	Composite	-0.99	NO	-1.60	YES

[1] Indicates if two-sided t-test applied to regression slope parameter shows slope (i.e., ozone trend) to be non-zero at the 95% probability level.
[2] This site was moved to a nearby location after the 1999 ozone season; data from both locations were combined to calculate the trend.

Table ES-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%

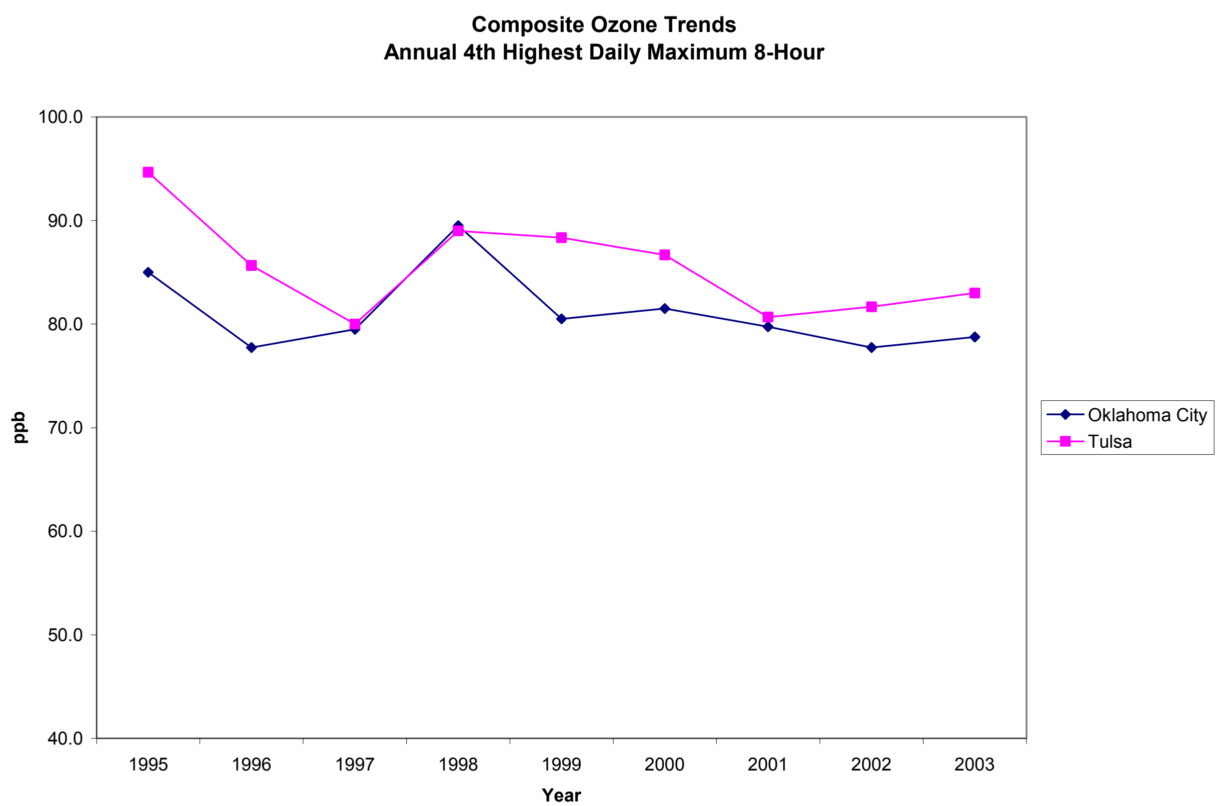


Figure ES-3. Composite trends in annual 4th highest daily maximum 8-hour ozone concentrations in Oklahoma City and Tulsa (based on monitoring sites with valid annual values for 1995 – 2003).

2007 Emission Control Scenarios

Several different emission control strategies were analyzed to assess their effectiveness for reducing 8-hour ozone concentrations in Tulsa and Oklahoma City. The following emission control scenarios were analyzed:

- 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 OKC (ACOG) and Tulsa (INCOG) have provided new link-based mobile source activity data for, respectively, Oklahoma City and Tulsa for the OKC TCMs and ITS/Transportation Congestion Mitigation control strategies. These control strategies are still being modified and the results are not yet available.

Using the 2001-2003 observed 8-hour ozone Design Values (DVs) attainment is demonstrated at all Oklahoma monitors for the 2007 Base Case. The control measures will further reduce 2007 ozone levels in Oklahoma, so attainment is still achieved for all the control strategies when the 2001-2003 observed 8-hour ozone Design Values are used in the 2007 projections.

Table ES-6 displays the 2007 projected 8-hour ozone Design Values for the Tulsa, Skiatook and OSDH monitors for the various 2007 emission control strategies using the 1998-2000 observed 8-hour ozone Design Values. The control measure not to allow several already permitted sources to build their facilities results in a 0.1 ppb reduction in the projected DVs at Tulsa and Skiatook. The 7.8 psi RVP gasoline measures, Stage II and Basic I/M control strategies all are sufficient to demonstrate attainment for the Tulsa monitor (84.9 ppb), but not the Skiatook monitor (87.2 ppb) using observed 1998 – 2000 Design Values.

Table ES-6. Projected 2007 8-hour ozone Design Values (DVs) using the observed 1998-2000 DVs for 2007 Control Strategies at key monitors in Tulsa and Oklahoma City.

		2007/2000 8-Hr O_3 DV (ppb)		
No.	**Scenario**	**Tulsa**	**Skiatook**	**OSDH**
Obs	**1998-2000 Observed 8-Hr O_3 DVs**	**89**	**93**	**84**
0.	Revised 2007 Base Case	85.2	87.5	80.2
Sensitivity Simulations				
2.	2007 5% VOC control in Tulsa MSA	85.1	87.4	80.2
3.	2007 5% NOx control in Tulsa MSA	85.1	87.1	80.2
4.	20075%VOC&NOxcontrolTulsaMSA	85.0	87.0	80.2
2007 Emissions Scenarios				
5.	Remove Expiring Permitted Sources (control measure retained in subsequent strategies)	85.0	87.3	80.0
6.	7.8 RVP in Tulsa TMA	84.9	87.2	80.0
7	Stage I Controls in Tulsa MSA	85.0	87.3	80.0
8.	7.8 RVP in OKC TMA	85.0	87.3	79.8
9.	Stage I in OKC MSA	85.0	87.3	79.9
10.	TCMs in OKC TMA			
11.	7.8 RVP in TTMA 85% market penetration in on-road/non-road	84.9	87.2	80.0
12.	ITS/Transportation Congestion Mitigation in TTMA	NA	NA	NA
13.	Combined 11. and 12.	NA	NA	NA
14.	AEP-PSO Oolagah 1 Unit Low NOx	85.0	87.1	80.0
15.	OG&E Muskogee 1 Unit Low NOx	84.9	87.2	80.0
16.	GRDA Chouteau 1 Unit Low NOx	85.0	87.2	80.0
17.	Combine 13.-16.	NA	NA	NA
18.	Stage II in Tulsa MSA	84.9	87.2	80.0
19.	Basic I/M in Tulsa TMA	NA	NA	NA

SUMMARY AND CONCLUSIONS

The photochemical modeling performed to support the Oklahoma 8-hour ozone Early Action Compact (EAC) projected 8-hour ozone Design Values to the 2007 future-year. The modeling demonstrated attainment of the 8-hour ozone standard in Oklahoma City. However, the modeled attainment test was inconclusive for Tulsa with modeled attainment test being passed when observed 2001-2003 Design Values are used, but not passed at two Tulsa monitors when observed 1998-2000 observed Design Values are used. A Weight of Evidence (WOE) analysis was performed that supported a finding that Tulsa and Oklahoma City would attain the 8-hour ozone standard in 2007.

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 designations will be based on ambient measurements taken during the three years of 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. Based on the latest air quality data (2001-2003) both areas are attaining the 8-hour ozone standard but have 8-hour ozone Design Values that are close to the standard. They may or may not be designated as 8-hour ozone nonattainment in the future depending on measured air quality.

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 protocol 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. To do so they need to move quickly to develop the emissions and photochemical modeling databases needed to develop an 8-hour ozone Plan by 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 (this report);

- 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) (this document);

- 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 (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 document presents the results of the CAMx future-year photochemical grid modeling for a 2007 Base Case and 2007 control strategy scenarios. More details can be found at the Oklahoma EAC website:

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

2. FUTURE-YEAR MODELING PROCEDURES

In this section we discuss the procedures used for the future-year modeling and how 8-hour ozone Design Values are projected in the future year.

EMISSION SCENARIOS

Base Case emission scenarios were developed for three years, 1999, 2002 and 2007. 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 weak 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.

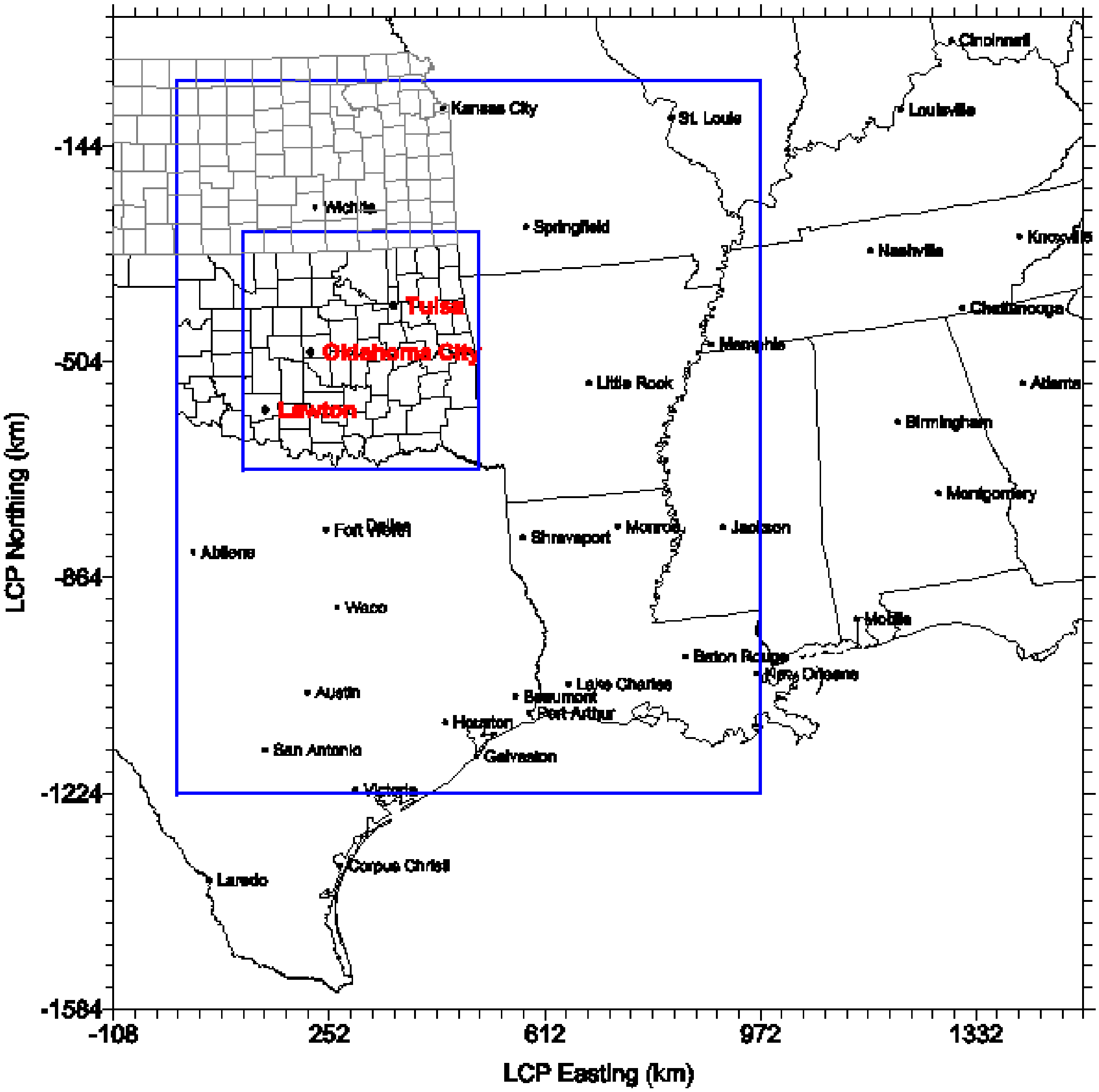
The August 13 – September 1,1999 episode is being modeled in CAMx using a Lambert Conformal Projection (LCP) nested grid configuration with grid resolutions of 36, 12 and 4 km (Figure 2-1). In CAMx, emissions are separated between surface (surface and low level point) emissions and elevated point source 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 all grid nests.

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

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 2-1.

2. **Regional Emissions Grid**. The regional emissions grid has 135 x 138 cells at 12-km resolution and covers the full area shown in Figure 2-1. This emissions grid is used for the 12 km CAMx grid by "windowing out" emissions for the appropriate region. In addition the regional emissions grid is aggregated from three by three 12-km cells to one 36-km cell over the entire area to generate the CAMx 36km grid.

Three separate base case emission inventories were prepared for the years of 1999, 2002 and 2007 future years. The emissions data sources and processing are described separately below for point, on-road mobile, area and off-road, and biogenic sources.



CAMx Grid Dimensions

LCP Grid with reference origin at (40 N, 100 W)

36 km Grid: 45 x 46 cells from (-108, -1584) to (1512, 72)
12 km Grid: 84 x 99 cells from (0, -1224) to (972, -36)
4 km Grid: 99 x 99 cells from (108, -684) to (504, -288)

(nested grid dimensions do not include buffer cells)

Figure 2-1. CAMx 36/12/4-km nested grids for Oklahoma 8-hour ozone.

1999 Base Case Scenario

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 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 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.

The Oklahoma EGUs were identified and removed from the NEIv2 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 that 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/.

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 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) 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 emissions inventory. 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 that 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. 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.

Area Sources

For all states other than Texas, the NEI 1999 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.

Off-Road Sources

For all states other than Texas, the NEI 1999 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-NonRoad 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.

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.

2002 Base Case

The 2002 Base Case used 2002 specific emissions for EGUs, mobile and non-road sources and projected 1999 emissions for smaller point and area sources. Biogenic emissions were assumed to be the same as in the 1999 Base Case scenario.

Point Sources

For all states other than Texas and Oklahoma, 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. 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.

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 for 2002 was estimated from the 1995 and 2025 Traffic Demand Model (TDM) outputs. The county level HPMS based VMT was estimated data from 1995 and 2000 Oklahoma HPMS data. MOBILE6.2 emission factors for 2002 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.

2007 BASE CASE

The procedures used to generate the 2007 Base Case emissions were very similar to what was used for 2002; only emission estimates from EPA's Heavy-Duty Diesel (HDD) rulemaking were also used.

Point Sources

For all states other than Texas, EGU emissions were based on 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 Oklahoma point source inventory was enhanced by ODEQ. A spreadsheet was provided which detailed newly permitted sources that would be operating in 2007 to add to the inventory and sources that will be shut down by 2007 and removed from the 1999 inventory.

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 2007 on-road mobile inventory was similar to 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 2007 area sources, the 1999 inventory is adjusted to 2002 estimates using growth factors developed from the Economic Growth Analysis System version 4.0 (EGAS). In 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 in Texas 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.

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 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 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 2002 modeling inventory.

Emission Summaries

Tables 2-1 through 2-2 display the NOx and VOC emissions in the Tulsa MSA for the three base case emission scenarios. A complete summary of emissions by county for both the Tulsa and Oklahoma City MSAs are provided in Appendix A.

Table 2-1. Summary of NOx 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		2007 Base Case		
		(TPD)	(% 1999)	(TPD)	(% 1999)	(% 2002)
Area	23.78	24.61	+3%	25.81	+9%	+5%
Off-Road	44.61	40.95	-8%	35.93	-20%	-12%
On-Road	95.42	88.28	-7%	61.57	-35%	-30%
Low-Points	3.33	3.33	0%	3.33	0%	0%
Elevated Points	129.14	97.98	-24%	102.31	-21%	+4%
Total	296.28	255.15	-14%	228.95	-23%	-10%

Table 2-2. Summary of 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		2007 Base Case		
		(TPD)	(% 1999)	(TPD)	(% 1999)	(% 2002)
Area	47.23	49.98	+6%	53.21	+13%	+6%
Off-Road	18.25	18.74	+3%	15.45	-15%	-18%
On-Road	78.86	73.47	-7%	52.74	-33%	-28%
Low-Points	8.70	8.70	0%	8.70	0%	0%
Elevated Points	2.01	2.76	+37%	3.22	+60%	+17%
Total	155.05	153.65	-1%	133.32	-14%	-13%

OTHER FUTURE-YEAR MODELING INPUTS

The same August 1999 episode meteorological conditions were used in the 2002 and 2007 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 same initial and boundary conditions as used in the August 1999 Base Case simulation were also used for the 2002 and 2007 modeling. The boundary conditions (BCs) are based on an August 1999 continental US simulation by EPA's Community Multiscale Air Quality (CMAQ) modeling system. The use the CMAQ 1999 BCs for the 2007 emission scenarios will overstate the level of ozone and precursors because it does not account for several regional emission control programs that have been projected to result in significant reductions in regional ozone concentrations and regional ozone transport. In particular, the following regional control programs are not reflected in the 2007 BCs:

- NOx SIP Call for large point source NOx emitters in the eastern US;
- Tier 2/Low Sulfur and fleet turn over for on-road light duty automotive mobile sources;
- Heavy Duty Diesel Rule for large diesel trucks; and
- Land based non-road engine rule;

Thus, actual 2007 ozone levels in Oklahoma will likely be lower than what is projected by the modeling.

PROJECTION OF 2007 8-HOUR OZONE DESIGN VALUES

The EPA draft guidance for 8-hour ozone modeling has 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 case of the Oklahoma application (EPA, 1999). With two minor exceptions (that have to do with keeping more precision in the design value calculations and is discussed in Section 3), 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 and 2002. 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) suggest 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 latest available version of the National Emissions Inventory (NEI) that is currently the 1999 NEI version 3, which implies that the observed 1998-2000 Design Values should be used. However, in the Oklahoma case, the 2002 Base Case uses 2002 on-road and non-road mobile source emissions, 2002 EGU emissions and additional permitted 2002 area and point sources added for Oklahoma. Only the area and minor point sources are based on the 1999 NEI and they are projected to 2002 using 2002 EGAS projection factors. Thus, the 2002 Base Case emissions for Oklahoma is based mainly on 2002 emissions data.

As further guidance on this issue we examined the recently published EPA's "Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (Interstate Air Quality Rule); Proposed Rule" (40 CFR Parts 51, 72, 75, and 96; Federal Register, Vol. 69, No. 20, Friday, January 30, 2004, pp. 4566). EPA's proposed Interstate Air Quality Rule (IAQR) performed ozone modeling of episodes from 1995 and developed a 2001 base case emissions scenario that was projected from the 1996 NET inventory. When selecting observed Design Values for projecting in the IAQR, EPA states the following:

> *"Ozone modeling was performed for 2001 emissions and for 2010 and 2015 Base Cases as part of the approach for forecasting which counties are expected to be nonattainment in these 2 future years. In general, the approach involves using the model in a relative sense to estimate the change in ozone between 2001 and each future year base case. Concentrations of ozone in 2010 were estimated by applying the relative change in model predicted ozone from 2001 to 2010 with present 8-hour ozone design values (2000-2002). The procedures for calculating future case design values are consistent with EPA's draft modeling guidance for 8-hour ozone attainment demonstrations, 'Draft Guidance on the Use of Models and Other Analysis in Attainment Demonstrations for the 8-Hour Ozone NAAQS.' The draft guidance specifies the use of the higher design value from (a) the period that straddles the emissions inventory Base Year or (b) the design value that was used to designate the area under the ozone NAAQS. In this case, 2000-2002 is the design value period which straddles the 2001 Base Year inventory and is also the latest period which is available for determining designation compliance with the NAAQS. Therefore, 2000-2002 was the only period used as the basis for the projections to the future years of 2010 and 2015."* (Federal Register, 2004, pg. 4592).

This is almost exactly the same situation as faced by the Oklahoma EAC, only Oklahoma has a 2002 Base Case emissions inventory and observed 2001-2003 Design Values will be used for the area designations in April 2004. Thus, the clarifying guidance from EPA's proposed IAQR suggests that the observed 2001-2003 8-hour ozone Design Values should be used to project 2007 Design Values for the Oklahoma EAC modeling. To resolve the conflicting interpretations from the EPA 8-hour modeling guidance (EPA, 1999), IAQR analysis (EPA, 2004) and statements from Region VI, in Section 3 we will calculated projected 2007 8-hour ozone Design Values using both the 1998-2000 and 2001-2003 observed 8-hour ozone Design Values. Note that for projecting 2007 Design Values using the 1998-2000 and 2001-2003 observed Design Values, current year base case simulations for 1999 and 2002, respectively, will be used. In Chapter 4 we present corroborative weight of evidence (WOE) analysis in which projected 2007 Design Values are calculated using 5 years of observed Design Values from 1999 to 2003.

3. FUTURE-YEAR MODELING RESULTS

As noted in Chapter 2, future-year 2007 8-hour ozone Design Values are projected using modeling results for the 1999, 2002 and 2007 emission scenarios and observed 8-hour ozone Design Values for 2001-2003 and 1998-2000 following EPA guidance (EPA, 1999; EPA, 2004).

2007 BASE CASE

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 3-1 and 3-2, respectively.

Table 3-1 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 3-1. For example, for the Skiatook monitor there were 14 days in the 2002 Base Case simulation where the maximum 8-hour ozone near the monitor exceeded 70 ppb and the average across these 14 days is 89.0 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. 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 89.0 and 85.8 ppb, respectively, so that the RRF is defined as 0.964 = 85.8/89.0. The projected 8-hour ozone Design Values for the 2007 Base Case are then shown in the last row of Table 3-1 that is obtained by multiplying the RRF times the observed Design Value. The maximum projected 8-hour ozone Design Value in 2007 for the 2007 Base Case when starting with the 2001-2003 observed DVs is 80.0 ppb at the Skiatook monitor in Tulsa. As this is below 85.0 ppb, then the 2007 Base Case demonstrates attainment of the 8-hour ozone standard in Oklahoma 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 3-2, which has the same format as Table 3-1. Differences with Table 3-1 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 not projected at two sites in the Tulsa MSA, Tulsa (85.2 ppb) and Skiatook (87.5 ppb). To demonstrate attainment the maximum projected 8-hour ozone DV must be 84.9 ppb or lower.

In Section 2 we noted that there were two areas in the Design Value projections where we deviate slightly from EPA guidance in order to make more precise calculations (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 Table 3-2). However, that doesn't make any sense as you loose precision and turns the RRFs into step functions, the benefits of control measures can be lost 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 does have an effect and is illogical. For example, the 85.2 ppb and 87.5 ppb projected 2007 Design Values shown in Table 3-2 for Tulsa and Skiatook that are calculated using the more precise RRF would become 85.9 and 86.9 ppb if the truncation were used. Thus in this case it doesn't change the modeled attainment test, but if truncation were performed prior to the RRF calculation it is likely we would not see any differences when applying control strategies.

Table 3-1. 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**	**Moore**	**Goldsby**	**Lawton**
2001-2003 DVs	***80***	***83***	***81***	***79***	***76***	***78***	***77***
99227	79.1	81.1	61.0	77.5	68.7	64.4	69.2
99228	83.2	89.7	67.1	87.2	80.0	74.3	70.1
99229	88.4	89.0	78.5	86.3	79.3	74.9	68.4
99230	86.6	77.6	82.3	84.4	82.4	72.4	66.6
99231	52.9	50.0	63.8	53.4	60.3	68.5	73.4
99232	65.4	64.1	73.2	71.4	67.0	64.6	60.3
99233	79.7	79.7	63.8	73.6	60.6	58.4	61.4
99234	77.7	81.6	68.9	72.2	67.3	69.5	68.0
99235	77.6	79.8	64.5	71.5	71.5	66.4	62.0
99236	42.4	42.3	53.1	49.5	53.7	60.2	62.1
99237	62.4	57.9	79.5	81.3	76.7	72.9	61.9
99238	102.6	102.6	77.3	78.8	68.4	64.8	55.6
99239	89.0	91.1	69.1	81.6	74.7	68.5	60.3
99240	101.7	102.8	74.7	93.3	81.5	76.7	72.6
99241	90.4	92.9	88.1	69.3	69.3	67.0	74.1
99242	92.2	94.7	76.1	79.3	69.5	64.7	68.3
99243	76.3	83.1	65.5	72.9	69.2	67.1	70.0
99244	92.1	100.0	79.8	85.5	77.6	76.1	76.9
#Days > 70 ppb	14	14	9	15	8	6	5
Avg 2002 Base	**86.9**	**89.0**	**78.8**	**79.8**	**78**	**74.5**	**73.4**
Sites	Tulsa	Skiatook	Glenpool	OSDH	Moore	Goldsby	Lawton
99227	76.3	77.7	57.2	74.8	66.5	62.8	67.5
99228	80.9	86.1	64.0	83.9	77.2	72.0	69.5
99229	86.8	86.8	76.8	84.7	78.1	73.5	67.6
99230	85.8	76.9	80.5	82.9	80.7	71.9	65.6
99231	53.3	49.5	63.5	53.4	61.0	68.1	71.6
99232	63.6	62.5	71.3	68.4	64.2	62.7	58.5
99233	77.7	77.7	60.6	71.9	58.6	56.7	59.8
99234	74.7	78.1	66.9	70.5	64.9	66.7	68.8
99235	75.4	76.6	62.6	71.0	71.0	66.4	62.0
99236	42.6	42.2	53.5	49.0	54.5	59.5	60.3
99237	62.6	57.7	79.9	78.9	74.4	71.1	60.7
99238	99.6	99.6	75.5	77.2	66.0	63.2	54.7
99239	86.2	87.6	67.2	78.9	72.0	67.3	59.2
99240	98.5	99.4	72.7	89.9	77.9	73.4	70.7
99241	88.4	90.0	84.5	68.2	67.6	64.0	71.1
99242	89	90.9	72.3	77.1	67.0	61.0	64.9
99243	74.1	79.5	62.5	68.8	64.5	62.7	65.8
99244	87.3	94.1	74.2	82.5	74.6	73.5	73.2
Avg 2007 Base	**84.3**	**85.8**	**76.4**	**77.4**	**75.7**	**72.5**	**71.2**
RRF	0.971	0.964	0.969	0.970	0.971	0.973	0.970
2007 Base DV	**77.7**	**80.0**	**78.5**	**76.7**	**73.8**	**75.9**	**74.7**

Table 3-2. 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 and observed 1998-2000 Design Values.

Sites	Tulsa	Skiatook	Glenpool	OSDH	Moore	Goldsby	Lawton
1998-2000 DVs	***89***	***93***	***82***	***84***	***84***	***83***	***84***
99227	80.3	83.0	62.4	79.1	70.1	66.3	71.6
99228	80.9	91.3	68.6	88.7	81.0	75.4	71.1
99229	89.5	90.9	80.0	89.0	80.1	76.0	70.3
99230	86.8	77.8	81.3	85.2	82.9	73.6	66.9
99231	51.5	50.6	63.5	54.2	60.6	69.0	74.1
99232	66.8	65.1	73.1	72.2	67.5	64.8	60.9
99233	80.5	80.5	64.9	74.5	62.2	59.5	62.4
99234	79.7	84.0	70.8	73.6	68.9	71.2	70
99235	79.5	82.5	66.0	72.3	72.3	67.4	61.7
99236	42.7	42.7	52.8	50.5	53.6	60.2	62.6
99237	61.4	58.8	78.4	81.2	76.7	73.0	63.4
99238	104.8	104.8	79.9	80.0	68.8	66.2	57.2
99239	90.8	93.5	71.2	82.4	75.0	69.1	61.6
99240	104.2	105.6	80.3	95.0	83.7	78.5	74.1
99241	91.7	96.7	91.7	69.3	69.3	69.2	77.1
99242	92.9	96.2	77.4	81.1	71.1	66.3	70.6
99243	76.6	85.3	66.6	74.3	70.0	68.2	71.9
99244	94.4	103.8	82.3	87.7	79.4	78.1	78.9
#Days > 70 ppb	14	14	11	15	11	7	10
Avg 1999 Base	**88.1**	**91.1**	**78.8**	**81.1**	**76.6**	**75.1**	**73.0**
Sites	Tulsa	Skiatook	Glenpool	OSDH	Moore	Goldsby	Lawton
99227	76.3	77.7	57.2	74.8	66.5	62.8	67.5
99228	80.9	86.1	64.0	83.9	77.2	72.0	69.5
99229	86.8	86.8	76.8	84.7	78.1	73.5	67.6
99230	85.8	76.9	80.5	82.9	80.7	71.9	65.6
99231	53.3	49.5	63.5	53.4	61	68.1	71.6
99232	63.6	62.5	71.3	68.4	64.2	62.7	58.5
99233	77.7	77.7	60.6	71.9	58.6	56.7	59.8
99234	74.7	78.1	66.9	70.5	64.9	66.7	68.8
99235	75.4	76.6	62.6	71.0	71.0	66.4	62.0
99236	42.6	42.2	53.5	49.0	54.5	59.5	60.3
99237	62.6	57.7	79.9	78.9	74.4	71.1	60.7
99238	99.6	99.6	75.5	77.2	66	63.2	54.7
99239	86.2	87.6	67.2	78.9	72	67.3	59.2
99240	98.5	99.4	72.7	89.9	77.9	73.4	70.7
99241	88.4	90.0	84.5	68.2	67.6	64.0	71.1
99242	89.0	90.9	72.3	77.1	67	61.0	64.9
99243	74.1	79.5	62.5	68.8	64.5	62.7	65.8
99244	87.3	94.1	74.2	82.5	74.6	73.5	73.2
Avg 2007 Base	**84.3**	**85.8**	**74.7**	**77.4**	**73.1**	**71.7**	**69.1**
RRF	0.958	0.941	0.948	0.955	0.954	0.955	0.947
2007 Base DV	**85.2**	**87.5**	**77.8**	**80.2**	**80.2**	**79.2**	**79.5**

2007 CONTROL SCENARIOS

Several different emission control strategies were analyzed to assess their effectiveness for reducing 8-hour ozone concentrations in Tulsa and Oklahoma City. The following emission control scenarios were analyzed:

- 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 OKC (ACOG) and Tulsa (INCOG) have provided new link-based mobile source activity data for, respectively, Oklahoma City and Tulsa for the OKC TCMs and ITS/Transportation Congestion Mitigation control strategies. The results for these control strategies are not yet available.

Using the 2001-2003 observed 8-hour ozone Design Values (DVs) attainment is demonstrated at all Oklahoma monitors for the 2007 Base Case. The control measures will further reduce 2007 ozone levels in Oklahoma, so attainment is still achieved for all the control strategies when the 2001-2003 observed 8-hour ozone Design Values are used in the 2007 projections.

Table 3-3 displays the 2007 projected 8-hour ozone Design Values for the Tulsa, Skiatook and OSDH monitors for the various 2007 emission control strategies using the 1998-2000 observed 8-hour ozone Design Values. The control measure not to allow several already permitted sources to build their facilities results in a 0.1 ppb reduction in the projected DVs at the Tulsa and Skiatook monitors. The 7.8 psi RVP gasoline measures, Stage II and Basic I/M control strategies all are sufficient to demonstrate attainment for the Tulsa monitor (84.9 ppb), but not the Skiatook monitor (87.2 ppb).

Table 3-3. Projected 2007 8-hour ozone Design Values (DVs) using the observed 1998-2000 DVs for 2007 Control Strategies at key monitors in Tulsa and Oklahoma City.

		2007 8-Hr O_3 DV (ppb)		
No.	**Scenario**	**Tulsa**	**Skiatook**	**OSDH**
Obs	**1998-2000 Observed 8-Hr O_3 DVs**	**89**	**93**	**84**
0.	Revised 2007 Base Case	85.2	87.5	80.2
	Sensitivity Simulations			
2.	2007 5% VOC control in Tulsa MSA	85.1	87.4	80.2
3.	2007 5% NOx control in Tulsa MSA	85.1	87.1	80.2
4.	20075%VOC&NOxcontrolTulsaMSA	85.0	87.0	80.2
	2007 Emissions Scenarios			
5.	Remove Expiring Permitted Sources (control measure retained in subsequent strategies)	85.0	87.3	80.0
6.	7.8 RVP in Tulsa TMA	84.9	87.2	80.0
7	Stage I Controls in Tulsa MSA	85.0	87.3	80.0
8.	7.8 RVP in OKC TMA	85.0	87.3	79.8
9.	Stage I in OKC MSA	85.0	87.3	79.9
10.	TCMs in OKC TMA			
11.	7.8 RVP in TTMA 85% market penetration in on-road/non-road	84.9	87.2	80.0
12.	ITS/Transportation Congestion Mitigation in TTMA	NA	NA	NA
13.	Combined 11. and 12.	NA	NA	NA
14.	AEP-PSO Oolagah 1 Unit Low NOx	85.0	87.1	80.0
15.	OG&E Muskogee 1 Unit Low NOx	84.9	87.2	80.0
16.	GRDA Chouteau 1 Unit Low NOx	85.0	87.2	80.0
17.	Combine 13.-16.	NA	NA	NA
18.	Stage II in Tulsa MSA	84.9	87.2	80.0
19.	Basic I/M in Tulsa TMA	NA	NA	NA

4. ADDITIONAL CORROBORATIVE ANALYSIS

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 Tulsa (85.2 ppb) and Skiatook (87.5 ppb) monitors, so therefore do not satisfy EPA's deterministic modeled attainment test (EPA, 1999). Thus, the modeled attainment test is inconclusive.

However, we believe the projected 2007 ozone Design Values are overstated because the modeling analysis failed to account for the large significant reductions in ozone and ozone precursors from outside the modeling domain. The boundary conditions (BCs) used in the 2007 modeling were based on a simulation of EPA's CMAQ model for an August 1999 base case emissions scenario. This simulation fails to account for numerous regional control programs that EPA estimates will effectively reduce regional ozone and ozone transport, including:

- NOx SIP Call for large stationary sources;
- Tier 2/Low Sulfur rule for gasoline automobiles;
- Heavy Duty Diesel Rule for large trucks; and
- Land-based non-road engine standards.

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 four elements that are part of a WOE attainment demonstration:

- Design Value scaling using alternative years observed 8-hour ozone Design Values;

- 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 Five Years of Design Values

Using the observed 2001-2003 8-hour ozone 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 Tulsa (85.2 ppb) and Skiatook (87.5 ppb) monitors. 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 5 years of observed DVs from 1999 to 2003, which is shown in Table 4-1. Using 5 years of observed DVs, the modeled attainment test is passed in 4 out of the 5 years analyzed, suggesting that the observed 1998-2000 DVs are the atypical ones.

Table 4-1. Projected 2007 8-hour ozone Design Values (DVs) in Oklahoma using the Revised 2007 Base Case emissions and five years of observed DVs from 1999 to 2003 (attainment demonstrated when project DV is 84.9 ppb or lower).

	Tulsa		Skiatook		OSDH	
Year	**Obs DV**	**2007 DV**	**Obs DV**	**2007 DV**	**Obs DV**	**2007 DV**
1997-1999	86	82.4	88	82.8	86	82.1
1998-2000	89	85.2	93	87.5	84	80.2
1999-2001	82	78.5	90	84.7	80	76.4
2000-2002	81	78.6	87	83.9	79	76.7
2001-2003	80	77.7	83	80.0	79	76.7

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:

> # Grid-Hours > 84 ppb: 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.
>
> # Grid-Cells > 84 ppb: Compute the number of grid-cells in which the daily maximum 8-hour ozone concentrations is greater than 84 ppb.
>
> Relative Difference (RD): 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). For the RD metric, an 80% reduction would be equivalent to a 0.20 value.

Table 4-2 below summarizes these metrics for the 1999 Base Case, 2007 Control Strategy 5, with the control measure not allowing already permitted sources to build, and Control Strategy 6, that also includes 7.8 RVP gasoline in the Tulsa TMA. Large reductions of 63% to 75% in all three modeling metrics are seen for the two 2007 strategies analyzed, Results for the other strategies are similar. Although the reductions in the air quality metrics are not as large as the 80% suggested by EPA, the conservatisms in the model are likely masking larger reductions (e.g., if 2007 boundary conditions were used in the modeling reductions in the metrics would likely exceed 80%).

Table 4-2. Summary of additional modeling metrics recommended by EPA in a WOE determination.

	# Grid-Hours 8-hr > 84 ppb		# Grid-Cell > 84ppb		Relative Difference	
	(#)	(%)	(#)	(%)	(ppb-hr)	(%)
1999 Base	7551		2001			
2007 Cntl#5 Remove Permitted Sources	2359	69%	733	63%	0.26	74%
2007 Cntl#6 7.8 RVP in TTMA	2327	69%	723	64%	0.25	75%

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 an 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. 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 4-3). Only sites with valid annual values in each year from 1995 – 2003 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 and 2003 only. Three of the six sites in Tulsa met the completeness criterion, the remaining three sites (Lynn Lane, Keystone, and Mannford) reported for only three, two, and one year(s), 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

[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.

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 4-1. Trend slopes and statistical significance results are shown in Table 4-4. Significance test results indicate a non-zero slope at the 95% probability level. For the 1995 – 2003 period, there is a small downward (negative) trend in all cases except for a small upward (positive) trend at the Glenpool site in Tulsa. Maximum value and composite trends are below –1 ppb/year and are not statistically significant. For the 1998 – 2003 period, all of the trends are negative with values of –1.6 ppb/year or more. In Oklahoma City, both the maximum value and composite trends are statistically significant; only the composite trend is statistically significant for Tulsa.

Anthropogenic emission totals are summarized for the 1999, 2000 and 2007 Base Case emission scenarios in Table 4-5. 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. This analysis will be updated with a full 10 years of data after Summer 2004.

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

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

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

City	Site	Period			
		1995-2003		1998-2003	
		Linear trend (ppb/year)	Significant?[2]	Linear trend (ppb/year)	Significant?
Oklahoma City					
	MOORE	-0.83	--	-2.94	--
	GOLDSBY	-0.05	--	-1.89	--
	OSDH	-0.75	--	-1.83	--
	EDMOND	-0.53	--	-0.63	--
	YUKON				
	CHOCTAW				
	Max Value	-0.70	NO	-2.03	YES
	Composite	-0.54	NO	-1.82	YES
Tulsa					
	TULSA[3]	-1.48	--	-2.77	--
	SKIATOOK	-0.95	--	-2.31	--
	GLENPOOL	-0.55	--	0.29	--
	KEYSTONE				
	LYNN LANE				
	MANNFORD				
	Max Value	-0.90	NO	-2.03	NO
	Composite	-0.99	NO	-1.60	YES

Table 4-5. 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		2007 Base Case		
		(TPD)	(% 1999)	(TPD)	(% 1999)	(% 2002)
NOx Emissions	296.28	255.15	-14%	228.95	-23%	-10%
VOC Emissions	155.05	153.65	-1%	133.32	-14%	-13%

[2] Indicates if two-sided t-test applied to regression slope parameter shows slope (i.e., ozone trend) to be non-zero 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.

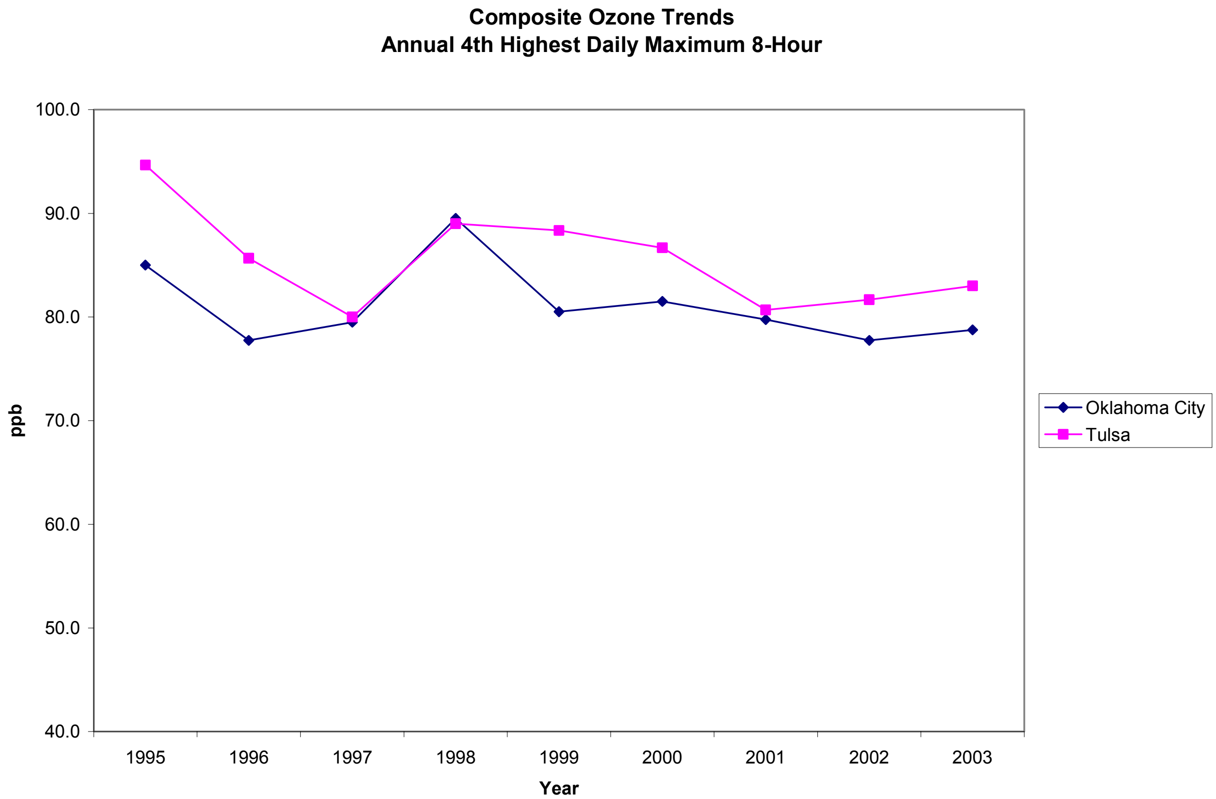


Figure 4-1. Composite trends in annual 4th highest daily maximum 8-hour ozone concentrations in Oklahoma City and Tulsa (based on monitoring sites with valid annual values for 1995 – 2003).

5. REFERENCES

ENVIRON. 2003. "Meteorological Modeling of the August 1999 Episode to Support the 8-Hour Ozone Early Action Compacts for Tulsa and Oklahoma City." Interim Report. Prepared for Oklahoma Department of Environmental Quality. April 14.

ENVIRON. 2002. "Modeling Protocol – Development of a Photochemical Modeling Database to Address 8-Hour Ozone Attainment in the Tulsa and Oklahoma City Area." Draft Report. Prepared for Oklahoma Department of Environmental Quality. December.

EPA. 1991. "Guideline for Regulatory Application of the Urban Airshed Model". EPA-450/4-91-013, U.S. Environmental Protection Agency Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711. July 1991.

EPA. 1999. "Draft Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-Hour Ozone NAAQS". EPA-454/R-99-004. EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711. May 1999.

EPA. 2004a. "Technical Support Document for the Interstate Air Quality Rule: Air Quality Modeling Analysis", prepared by the EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC.

EPA. 2004b. "Air Quality Data Analysis Technical Support Document for the Proposed Interstate Air Quality Rule", prepared by the EPA Office of Air Quality Planning and Standards, Research Triangle Park, NC.

Federal Register. 2004. 40 CFR Parts 51, 72, 75, and 96. Rule to Reduce Interstate Transport of Fine Particulate Matter and Ozone (Interstate Air Quality Rule): Proposed Rule. Vol. 69, No. 20, pp. 4565-4650.

Jia Y. and R.E. Morris. 2003a. "Meteorological Modeling of the August 1999 Episode to Support the 8-Hour Ozone Early Action Compacts for Tulsa and Oklahoma City." Draft Final Report. Prepared for Oklahoma Department of Environmental Quality. August 29.

Jia Y. and R.E. Morris. 2003b. "Meteorological Modeling of the August 1999 Episode to Support the 8-Hour Ozone Early Action Compacts for Tulsa and Oklahoma City." Revised Draft Final Report. Prepared for Oklahoma Department of Environmental Quality. September 15.

Morris R.E., Y. Jia and E. Tai. 2003a. "Preliminary CAMx Base Case Modeling and Model Performance Evaluation for the Oklahoma August 1999 8-Hour Ozone Episode". Draft Memorandum. Prepared for Oklahoma 8-Hour Ozone Early Action Compact Technical Advisory Committee. September 17.

Morris R.E., E. Tai and Y. Jia. 2003b. "Base Case Photochemical Modeling of the August 1999 Episode and Model Performance Evaluation to Support the 8-Hour Ozone Early Action Compacts for Tulsa and Oklahoma City". Draft Report. Prepared for Oklahoma 8-Hour Ozone Early Action Compact Technical Advisory Committee. December 22.