July 6, 2007

The Honorable Richard Greene
Regional Administrator
Region VI
Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, TX 75202

Dear Mayor Greene,

Attached pleased find a report entitled "Technical Analysis of the 2007 Dallas-Fort Worth 8-Hour Ozone SIP," which provides an independent review of the Dallas-Fort Worth Eight Hour Ozone Nonattainment Area Attainment Demonstration and the associated Chapter 117 rules, adopted by the Texas Commission on Environmental Quality on May 23, 2007, and submitted by the State of Texas to EPA on June 15, 2007.

I appreciate the hard work of TCEQ staff in the preparation of the SIP and the efforts of other entities like EPA, NCTCOG, and TxDOT in support. However, I strongly believe that the SIP submitted by the State of Texas fails to meet the requirements of the federal Clean Air Act and that the DFW area will continue to violate the ozone standard on the attainment date of June 15, 2010.

In accordance with your authority in Section 110 of the Clean Air Act, I respectfully ask that EPA make a formal and public finding of disapproval of the SIP because it is substantially inadequate to attain the 8-hour ozone standard and because it fails to provide for the implementation of all reasonably available control measures. Simultaneous with the disapproval and finding of substantial inadequacy, EPA should publish notification that 18-months from the date of disapproval it intends to pursue sanctions authorized by Section 179 of Clean Air Act unless an approvable SIP is submitted.

The report attached to this letter demonstrates many of the reasons that the submitted SIP is substantially inadequate to attain the 8-hour ozone standard. It includes a discussion of changes to the SIP from proposal in December 2006 to submittal in June 2007. It also includes technical analyses of problems with the photochemical modeling and the weight of evidence demonstration.

In addition, this report includes a proposal for a comprehensive set of reasonably available control measures that were not included by the State in the SIP under review. I believe that adoption and vigorous enforcement of these additional measures could go a long way to producing a technically and substantially adequate SIP and get the DFW area into attainment with the ozone standard.

On page 1-4 of the Submitted SIP, the State of Texas stated:

> "To support the eight-hour ozone standard, the EPA provided information that indicated that even low levels of ozone can significantly decrease lung capacity temporarily in some healthy adults and cause inflammation of lung tissue, aggravate asthma, and make people more susceptible to respiratory illnesses such as bronchitis and pneumonia. Children are at a higher risk from exposure to ozone, since they breathe more air per pound of body weight than adults and because children's respiratory systems are still developing. Children also spend a considerable amount of time outdoors during summer and during the start of the school year (August-October) when ozone levels are typically higher. Adults most at risk to ozone exposure are outdoor workers, people outside exercising, and individuals with preexisting respiratory diseases."

It is possible in discussions of design values, photochemistry, and selective catalytic reduction to forget that the SIP is designed to protect public health and save lives. The evidence is overwhelming that our ozone problem is harming children, the elderly, and the infirm. The technical problem of ozone is solvable, if federal, state, and local officials muster the political courage to do what is required by the Clean Air Act.

Please feel free to contact me if you have any questions. I am ready to assist any way that I can.

Sincerely,

Al Armendariz, Ph.D.
Southern Methodist University
Dallas, Texas

cc: Thomas Diggs/EPA, Region 6, Dallas
Carl Edlund/EPA, Region 6, Dallas
Steve Page/EPA, OAQPS, RTP

State Senator Kim Brimer, Fort Worth
State Senator Chris Harris, Arlington
State Representative Phil King, Weatherford
Mayor Mike Moncrief, Fort Worth
Mayor Robert Cluck, M.D., Arlington
County Judge Glen Whitley, Tarrant County
County Judge Mark Riley, Parker County
County Judge Mary Horn, Denton County

Technical Analysis of the 2007 Dallas-Fort Worth 8-Hour Ozone SIP

Prepared
July 6, 2007

Submitted to:
The Honorable Richard Greene
Regional Administrator
Region VI
Environmental Protection Agency

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EXECUTIVE SUMMARY

On June 15, 2007, the State of Texas submitted to the United States Environmental Protection Agency revisions to the State Implementation Plan (SIP) for the Dallas-Fort Worth Ozone Nonattainment Area (the Submitted SIP). The State of Texas was required to submit a SIP that demonstrated attainment with the National Ambient Air Quality Standard for ozone of the federal Clean Air Act.

This report contains an independent technical analysis of the Submitted SIP, including evaluations of the photochemical modeling and the weight of evidence. In contrast to the conclusions of the State of Texas, this report demonstrates that the Submitted SIP is legally and substantially inadequate and that DFW area will not be in compliance with the ozone standard by the attainment date of June 15, 2010.

EPA can only approve the Dallas-Fort Worth 8-Hour Ozone SIP if it believes that the photochemical modeling and the weight of evidence demonstrate that the area will be in compliance with the 84 ppb ozone standard.

Analysis of the weight of evidence shows that:

- Ozone design values in DFW have to drop from 96 ppb in 2006 to 84 ppb by the end of the 2009 ozone season.
- In order to attain the 84 ppb standard, ozone levels have to drop more than 10 times faster than long-term trend data from the State shows is actually occurring.
- Short-term (last 4 years) data show that linear trends of ozone levels across the DFW area are increasing on average.
- These short-term trends show that the rate of increase is highest in Tarrant, Denton, and Parker Counties at +1.1 ppb/year. Denton and Tarrant Counties have been the locations of all of the DFW area's high ozone design values since 2000.

Analysis of the photochemical modeling shows that:

- Four monitors in the DFW area were predicted by the modeling to be above the 85 ppb standard. These monitors represent Dallas, Tarrant, Denton, and Collin Counties.
- Two of these counties were predicted to be above EPA's "wide margin" failure level of 88 ppb.
- EPA guidance states that if the photochemical modeling shows even 1 location above the 88 ppb "wide margin" failure level, then it is unlikely that a weight of evidence determination can be convincing to conclude that the ozone standard will be attained.
- The photochemical modeling in the SIP is on weak technical grounds since it relied on modeling a single ozone episode from 1999.
- With the weakness inherent in the photochemical modeling, EPA should only consider approving the DFW SIP if the modeling showed all area monitors below

the 85 ppb standard and the weight of evidence was convincing that attainment by 2009 was assured. Neither of those two conditions has been satisfied.

It is clear that the SIP submitted by the State of Texas fails to meet the requirements of the Clean Air Act. It is also clear that unless additional emissions reductions are made, the DFW area will continue to violate the ozone standard on the attainment date.

Together with ongoing state and federal programs, the Submitted SIP has regulations to reduce NOx emissions in DFW by 60 tons per day (tpd) and to also reduce emissions in northeast Texas by 25 tpd from 2007 through June 15, 2010. The photochemical modeling and the weight of evidence demonstrate that these reductions are extremely inadequate to lower ozone levels in DFW to the 84 ppb attainment level.

This report proposes a suite of reasonably available control measures that are technically feasible and cost effective for 4 of the major source categories affecting ozone concentrations in DFW: on-road mobile sources, electric generating units, gas compressor engines, and cement kilns.

Adding the proposed emissions reductions to the ones in the Submitted SIP would almost double the NOx reductions in the DFW area, adding another 42 tpd of emission reductions. In addition, the proposed emissions reductions for east and central Texas increase reductions there from 25 tpd to 300 tpd.

In accordance with the Clean Air Act, EPA should publish a formal finding that the SIP is substantially inadequate to attain the 8-hour ozone standard and does not contain all reasonably available control measures. EPA should require the State of Texas to submit a revised SIP with substantially greater emissions reductions. Along with the disapproval and finding of substantial inadequacy, EPA should publish notification that 18-months from the date of disapproval it intends to pursue sanctions authorized by Section 179 of Clean Air Act, unless an approvable SIP is submitted.

Technical Analysis of the 2007 Dallas-Fort Worth 8-Hour Ozone SIP
July 9, 2007

1.0 BACKGROUND

On June 15, 2007, the State of Texas submitted to the United States Environmental Protection Agency (EPA) revisions to the State Implementation Plan (SIP) that included the Dallas-Fort Worth Eight-Hour Ozone Nonattainment Area Attainment Demonstration and the associated Chapter 117 rules (the Submitted SIP). The State of Texas was required to submit a SIP that demonstrated attainment with the 8-hour ozone standard of the federal Clean Air Act (CAA). The Submitted SIP included a number of components, and relied on photochemical modeling and a weight of evidence determination to show compliance with the ozone standard. In the Submitted SIP, the State of Texas stated that the DFW area will be in compliance with the National Ambient Air Quality Standard for ozone by the mandated attainment date of June 15, 2010.

This report contains an independent technical analysis of the Submitted SIP, including evaluations of the photochemical modeling and the weight of evidence determination. In contrast to the conclusions of the State of Texas, this report shows that the Submitted SIP is legally and substantially inadequate, that it fails to provide for the implementation of all reasonably available control measures, and that the DFW area will not be in compliance with the ozone standard by June 15, 2010.

2.0 PHOTOCHEMICAL MODELING

The photochemical modeling in the Submitted SIP predicted that 4 of the monitors in the 9-county DFW nonattainment area will have ozone design values at or above 85 ppb on the attainment date, in violation of the ozone standard (Submitted SIP, Table 2-10, p. 2-45). The violating monitors and their design values were: Frisco C31 - 88 ppb, Dallas Hinton C60 - 86 ppb, Denton C56 - 88 ppb, and Fort Worth NW C13 85 ppb. The photochemical modeling results in the Submitted SIP were worse than those in the draft SIP proposed on December 13, 2006 (the Proposed SIP), which predicted that two monitors would be over the standard (Proposed SIP, Table 2-10, p. 2-46).

In contrast to the situation in December 2006, when the State of Texas was proposing a SIP with the two northernmost monitors above the standard, the photochemical modeling in the Submitted SIP showed 4 monitors, each in different counties, to be above the standard. The populations of these 4 counties represent over 90% of the total population in the DFW 9-county area, and the most recent photochemical modeling results predicted that each county will be violating the ozone standard.

The reasons for the increased number of locations predicted to be in nonattainment, and the severity of the ozone levels, were relaxations in the NOx reductions in the Submitted SIP (42.7 tpd) compared to the Proposed SIP (87.4 tpd). In other words, between December 2006 and June 2007, the State of Texas substantially relaxed many of the emissions cuts originally proposed (compare Submitted SIP, Table 2-6, p. 2-37 to Proposed SIP, Table 2-6, p. 2-38). On top of these relaxations, the SIP was amended at the last minute on the day of adoption to allow additional NOx emissions.

The photochemical modeling demonstration and the weight of evidence determination are the principal analytical tools for States when preparing ozone attainment demonstrations. Given the large number of monitors that the most recent photochemical modeling indicates will be over the standard and the dispersion of these violating monitors across the DFW area the State of Texas has not submitted a SIP that can be approved under the federal Clean Air Act and is protective of public health.

EPA asks states to submit a "corroborative analysis" in a "weight of evidence determination" in attainment demonstrations to either support or undercut the predictions of the photochemical modeling. The weight of evidence determination is critical when future ozone concentrations predicted by photochemical modeling are at, or just above, or just below the 85 ppb standard. The State of Texas has submitted a weight of evidence determination and believes that when combined with the photochemical modeling, the SIP demonstrates attainment. However, the analysis of the State's own data in the next section of this report will show that the State's corroborative analysis supports a finding that the area will not achieve attainment by June 15, 2010, and therefore, that the Submitted SIP is legally inadequate and must be revised with additional emissions reductions.

3.0 WEIGHT OF EVIDENCE

3.1 EPA Guidance

In "Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS", [EPA-454/R-05-002, October 2005] (EPA Attainment Guidance Document), EPA asks States to use a "corroborative analysis" in a "weight of evidence determination" to analyze data other than the photochemical modeling to determine if an area will or will not be in attainment with the ozone standard. This process allows a state to claim that an area will achieve attainment despite photochemical modeling results which predict that the area will violate the standard. EPA's guidance places very clear restrictions on the use of weight of evidence determinations to overrule the conclusions of the photochemical modeling. In its guidance EPA states,

> "If the test [using photochemical modeling] is failed by a wide margin (e.g., future design values greater than or equal to 88 ppb at an individual site or multiple sites/locations), it is far less likely that the more qualitative arguments made in a weight of evidence determination can be sufficiently convincing to conclude that the NAAQS will be attained."

The guidance is clear that the higher the ozone levels predicted by the photochemical modeling, the steeper the burden of evidence is on the State if it elects to use a weight of evidence determination to claim that a SIP demonstrates attainment. EPA states that if the photochemical modeling shows that even 1 monitor fails to attain compliance by a "wide margin" of 88 ppb, then it is unlikely that that weight of evidence determination can be convincing to overrule the photochemical modeling. As noted earlier, the Submitted SIP shows 4 locations at or above the 85 ppb standard, and not just 1, but 2 of these locations at or above the "wide margin" failure level of 88 ppb.

3.2 Long-Term Ozone Trends

The first portion of the weight of evidence determination in the Submitted SIP includes a summary of 8-hour design values from 1991 - 2006 (Submitted SIP, Figure 3-1, p. 3-2). Design values have decreased from 105 ppb to 96 ppb during this 16-year time period. The State performed a linear regression on the design values and determined a relationship of: DV = -0.27 * Year +102, which suggests that on average, over 16 years, the annual decrease in design values is approximately 0.27 ppb per year.

Figure 3a. One Hour and Eight Hour Ozone Design Values in the DFW Area (TCEQ, Submitted SIP, Figure 3-1)

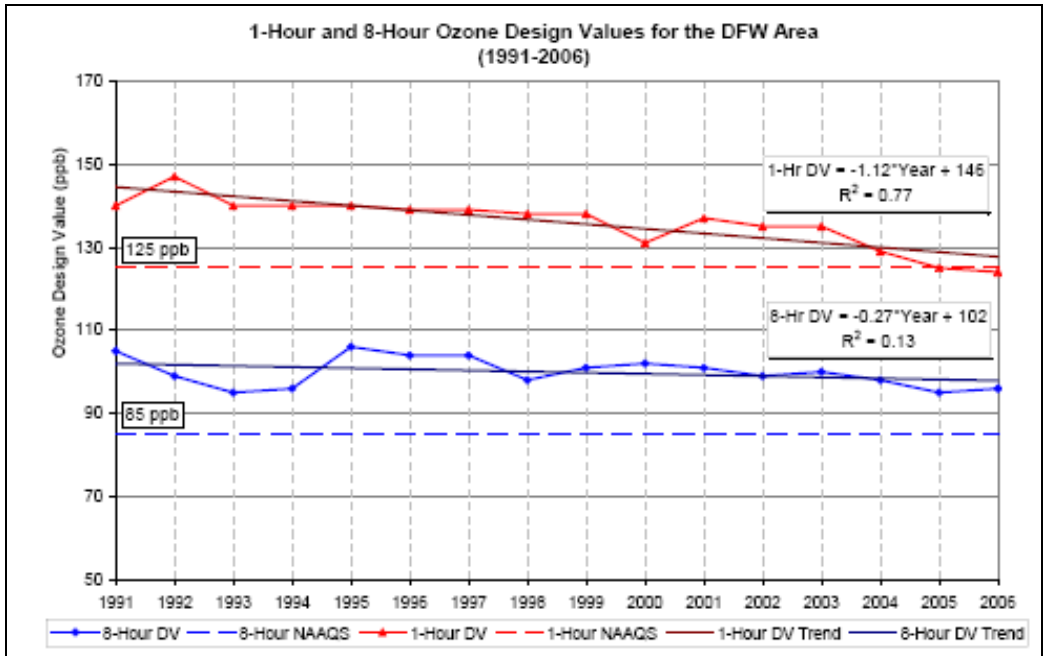
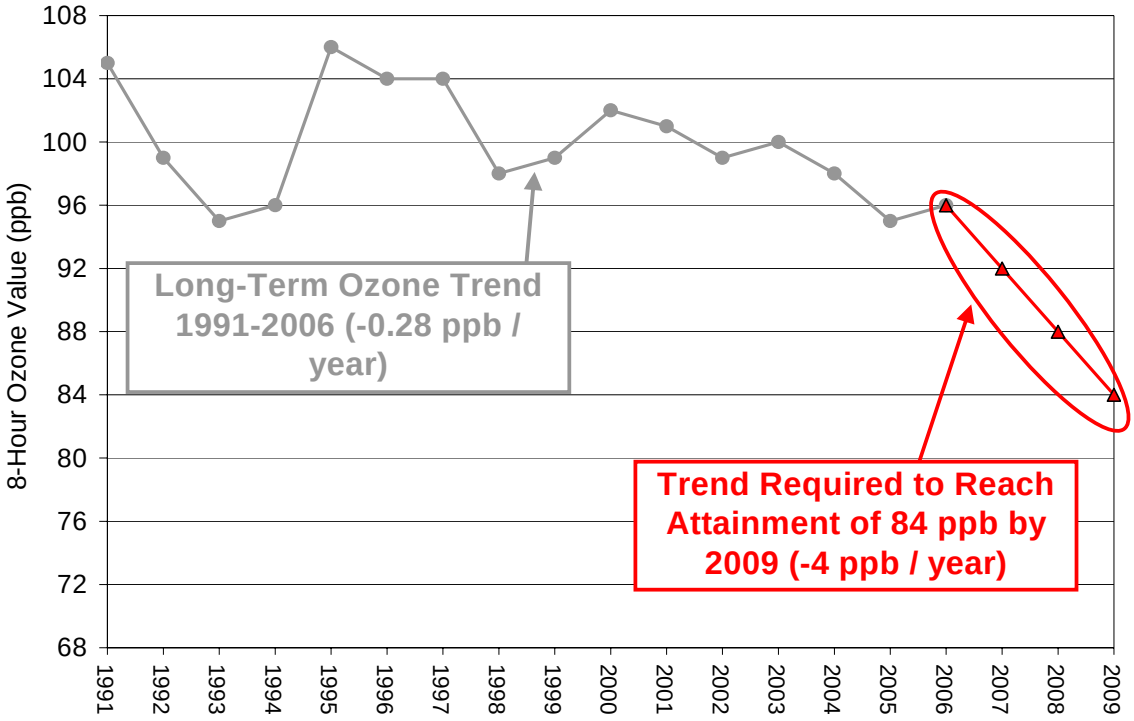


Figure 3-1: One-Hour and Eight-Hour Ozone Design Values in the DFW Area (1991-2006)

Although the State's linear regression analysis is simplistic, it is informative. The DFW area has to achieve a design value after the 2009 ozone season of 84 ppb. The 2006 ozone design value was 96, which means that in 3 years, the design value has to drop 12 ppb, or at a mean rate of 4 ppb per year. The State's own data show that ozone design values over the last 16-years are dropping at only 0.27 ppb per year. Therefore, beginning immediately design values have to begin dropping at 14.8 times the current rate (4 / 0.27 = 14.8) in order to reach 84 ppb by the attainment date. Figure 3b shows graphically what has to happen with design values to reach 84 ppb by the attainment date.

Figure 3b. Long-Term Trends in Eight Hour Ozone Design Values in the DFW Area



The weight of evidence from long-term ozone trends shows that it is highly improbable that the Submitted SIP will get the DFW area into attainment with the ozone standard by the attainment date. To do so, ozone concentrations would have to begin dropping immediately at a rate more than an order of magnitude greater than the long-term data show is actually occurring.

Unless EPA believes and can technically justify that ozone design values in the DFW area will begin dropping at the rate shown above in Figure 3b, the Submitted SIP must be found to be substantially inadequate, and must not be approved.

3.3 Previous NOx Reduction Efforts

The Submitted SIP includes an emissions inventory of known NOx sources in the DFW area from 1990 through 2003 (Submitted SIP, Figure 3-15, p. 3-14). From 1998 to 2003, NOx emissions in the inventory fell approximately 150 tpd, from 680 tpd to 530 tpd, which represented a 21% drop in known emissions from 1998 levels.

Figure 3c. DFW NOx Emissions Inventory from 1990-2003 (TCEQ, Submitted SIP, Figure 3-15)

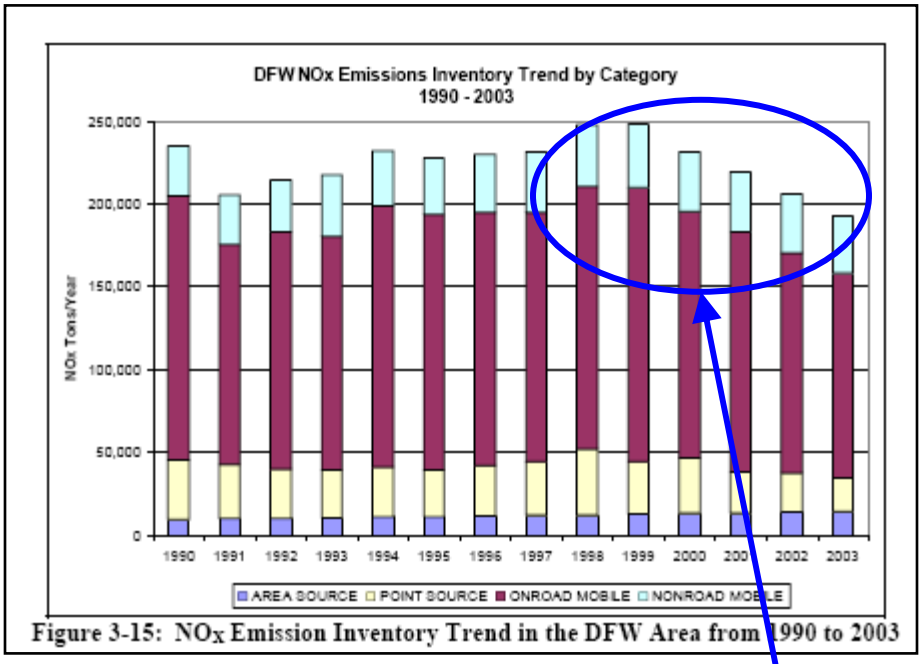


Figure 3-15: NO_X Emission Inventory Trend in the DFW Area from 1990 to 2003

1998 to 2003 NOx Reductions of 150 tpd in DFW (21% reduction)

The Submitted SIP also includes an emissions inventory for the entire 110-County East Texas Area (Submitted SIP, Figure 3-17, p. 3-17). From 1998 to 2003, known NOx emissions region-wide dropped approximately 840 tpd, from 1850 tpd to 1010 tpd, which represented a 45% drop in emissions from 1998 levels.

Figure 3d. East Texas NOx Emissions Inventory from 1990-2003 (TCEQ, Submitted SIP, Figure, 3-17)

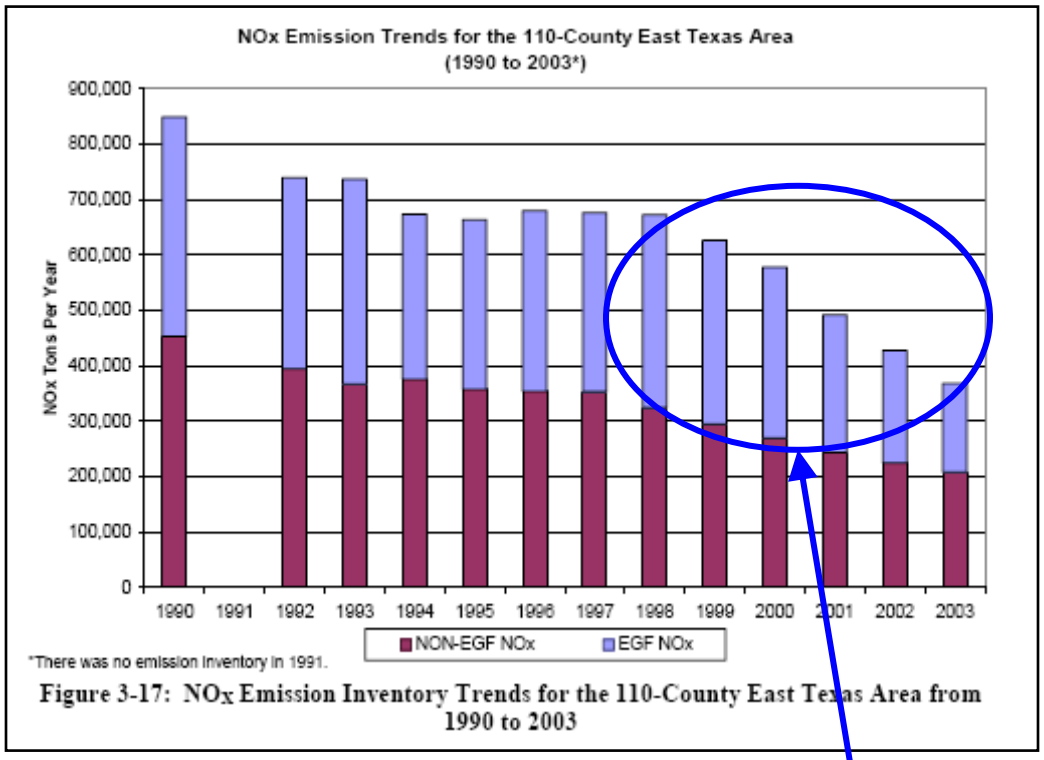


Figure 3-17: NO_X Emission Inventory Trends for the 110-County East Texas Area from 1990 to 2003

1998 to 2003 NOx Reductions of 840 tpd across all of East Texas (45% reduction)

A comparison between these reductions and the measured ozone design values in DFW during this same time period is vital for establishing the weight of evidence in the Submitted SIP. In comments EPA submitted to the State of Texas regarding the Proposed SIP, EPA itself asked the State to perform such a comparison (EPA, Comments to Proposed SIP, February 12, 2007, p. 62 of Response to Comments):

> "We recommend that TCEQ quantify the amount of emissions reductions within the DFW nonattainment area (and potentially Texas overall) that are expected to occur from a year such as 1999/2000 to 2009 and compare with DV trends during this period."

It is regrettable, although understandable, that the State failed to perform the EPA-requested comparison. It is included in this report because, as EPA implied by its comments, the analysis is critical to the weight of evidence determination.

Figure 3-1 of the Submitted SIP shows that design values in DFW were virtually flat during the 1998 to 2003 time period, and actually increased slightly from 98 to 99 ppb. **The 21% reduction in known NOx emissions in DFW during this time period were completely insufficient to produce <u>any</u> reduction in measured ozone design values.**

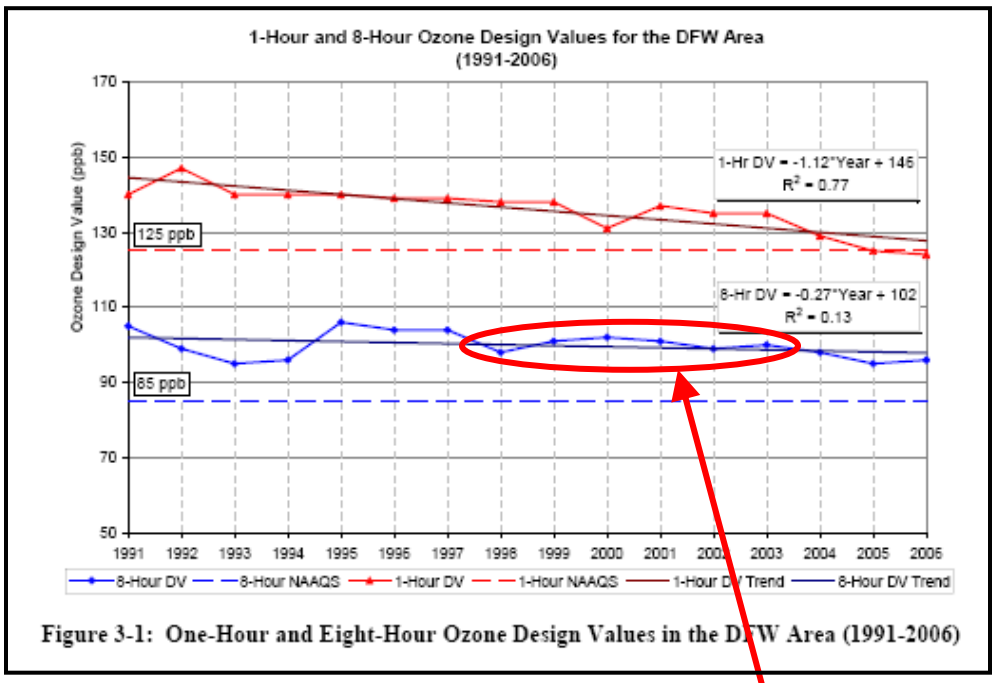


Figure 3-1: One-Hour and Eight-Hour Ozone Design Values in the DFW Area (1991-2006)

1998 to 2003 NOx Reductions Insufficient to Reduce 8-Hour Ozone DVs

Given the lack of response in ozone design values to the NOx emissions reductions from 1998 to 2003, it is important to compare the emissions reductions during this period to those planned in the Submitted SIP. From 1998 to 2003, DFW NOx emissions were reduced 150 tpd or 21%. The Submitted SIP currently under review is based on NOx reductions from 2006 to 2009 of approximately 60 tpd or 13% (from 480 tpd to 420 tpd).

Emissions reductions from 1998 to 2003 were significantly larger in both tons per day and as a percentage of total known emissions than the emissions reductions planned in the Submitted SIP. The reductions from 1998 to 2003 were insufficient to reduce ozone design values at all, and therefore, the weight of evidence is strong that the even smaller reductions planned in the Submitted SIP will be insufficient to produce the dramatic drop in ozone design values needed to bring DFW into attainment with the ozone standard.

3.4 Weight of Long-Term Evidence from Denton County

The 2006 design value at the Denton C56 monitor was 95 ppb and the photochemical modeling is predicting a 2009 design value of 88 ppb (Submitted SIP, Table 2-10, p. 2-45). The 10-year trend in ozone design values for Denton was provided by the State in Figure 3-5 of the Submitted SIP. The 4th highest values at this monitor (the purple and white dots) are used in calculations of the design value for this monitor.

The State's data show that the 4th highest ozone values at the Denton monitor *increased* in 2005 and 2006, and the data also show an increase in the 3-year design value in 2006. Using the State's data, the trends that are required for the 4th highest 8-hour ozone value and for the 3-year design value to reach the attainment concentration of 84 ppb are shown in Figure 3f.

Figure 3f. Trends Required for Attainment at the Denton Monitor

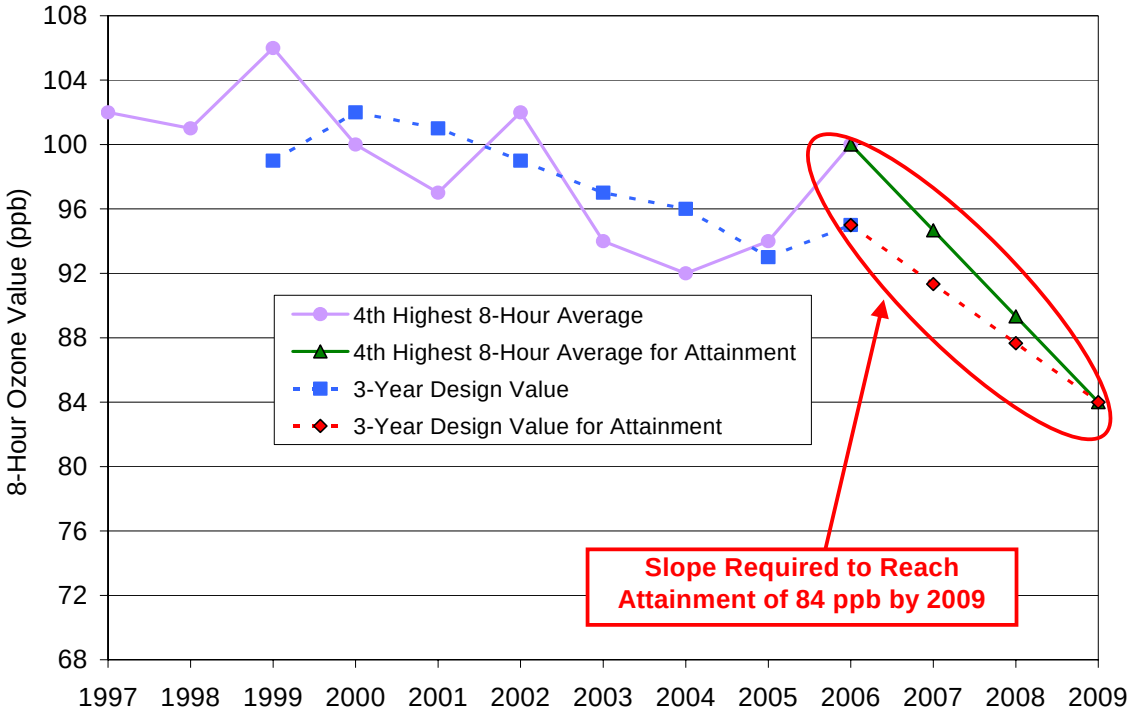


Figure 3f shows that the rates of reduction in ozone concentration at the Denton monitor would have to be at unprecedented levels for the monitor to show attainment with the ozone standard. Since the emissions reductions in the Submitted SIP are even smaller than emissions reductions in previous years that failed to provide large drops in ozone levels, the weight of evidence is compelling that the Denton monitor will continue to be in nonattainment and above 84 ppb on the attainment date.

Unless EPA believes and can technically justify that ozone design values at the Denton monitor will begin dropping at the rate shown above in Figure 3f, the Submitted SIP must be found to be substantially inadequate, and must not be approved.

3.5 Weight of Long-Term Evidence from Tarrant County

The 2006 design value at the Eagle Mountain Lake C75 monitor in Tarrant County was 96 ppb. The State's data show that the 3-year design value at the monitor increased in 2005 and 2006. Using the State's data, the trends that are required for the 4th highest 8-hour ozone value and for the 3-year design value to reach 84 ppb are shown in Figure 3g.

Figure 3g. Trends Required for Attainment at the Eagle Mountain Lake Monitor

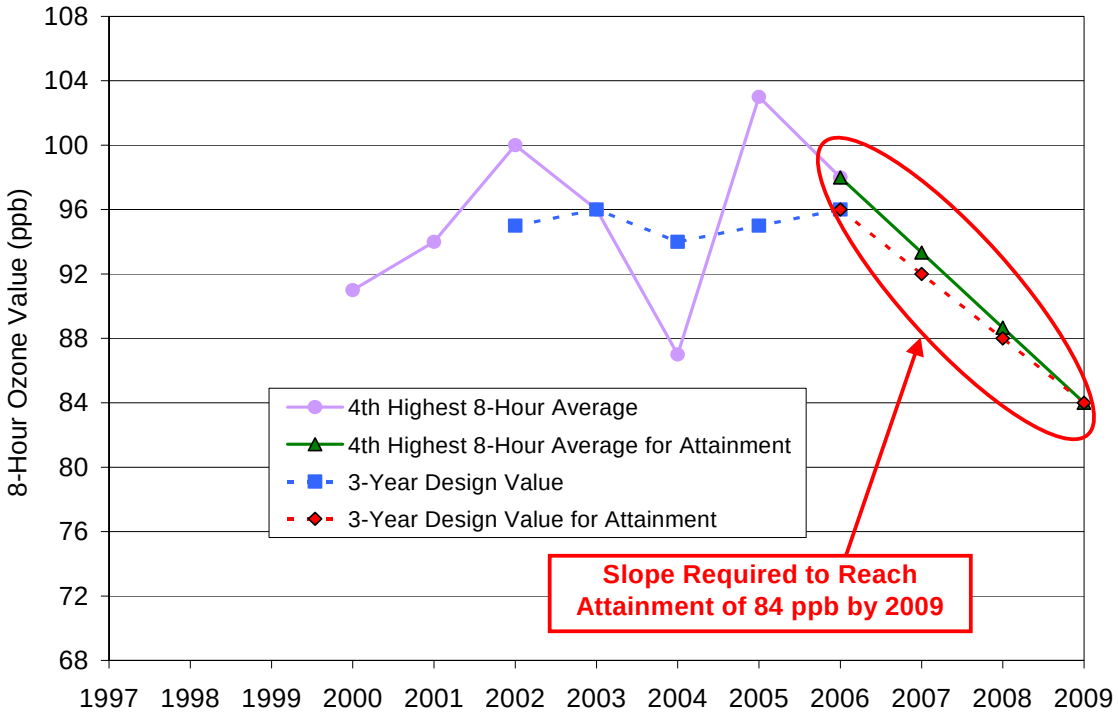


Figure 3g demonstrates that the rate of reduction in ozone concentration at the Eagle Mountain Lake monitor in Tarrant County would have to be at improbable levels for the monitor to show attainment with the ozone standard by 2009. The weight of evidence is strong that the Eagle Mountain Lake monitor will continue to be in nonattainment and above 84 ppb.

Unless EPA believes and can technically justify that ozone design values in at the Eagle Mountain Lake monitor will begin dropping at the rate shown above in Figure 3g, the Submitted SIP must be found to be substantially inadequate, and must not be approved.

3.6 Weight of Short-Term Evidence from Across DFW

The preceding analyses regarding the Denton and Eagle Mountain Lake monitors demonstrate that these two monitors are highly unlikely to achieve the ozone standard by the attainment date. In addition, Figure 3-1 of the Submitted SIP shows that the future rate of the decrease in the overall DFW-area design value will have to be more than an order of magnitude (14.8 times) greater than the long-term rate of decrease measured from 1991-2006, in order for the area to reach attainment.

In addition to those long-term trend analyses, it is important to examine more recent trends in ozone concentrations. There were 17 locations in the DFW area that monitored ozone during the 4-year period from 2003-2006. Table 3a shows the 4th highest 8-hour ozone values measured at each station, and the linear trend in the values in (+/-) ppb change per year.

Table 3a. 4th Highest 8-Hour Ozone Values From 2003-2006 Across the DFW Nonattainment Area.

Monitor	2003	2004	2005	2006	**4-Year Linear Trend (ppb change/year)**
Frisco	87	94	93	91	1.1
Dallas North	88	87	95	86	0.2
Denton	94	92	94	100	2.0
Midlothian	86	87	81	79	-2.7
FW NW	96	90	99	95	0.6
Keller	97	92	98	94	-0.3
Dallas Hinton	91	86	95	82	-1.8
Dallas Exec	89	88	88	89	0.0
Granbury	79	80	84	89	3.4
Greenville	77	80	81	78	0.4
Cleburn	85	93	90	80	-1.8
Kaufman	71	73	77	77	2.2
Parker	87	79	97	89	2.4
Rockwall	83	81	81	79	-1.2
Eagle Mountain	96	87	103	98	2.2
Grapevine	95	92	94	95	0.2
Arlington	85	84	93	85	0.9
				MEAN	**0.46 increase**

Table 3a shows that on average most monitors in the DFW are showing an *increasing* trend in ozone concentrations over the last 4-years. The mean value of the linear 4-year trends indicates that these ozone values are increasing at a rate of approximately 0.5 ppb per year.

3.7 Weight of Short-Term Evidence from Tarrant, Parker, and Denton Counties

The dominant wind patterns during the ozone season carry ozone and ozone precursors into Tarrant, Parker, and Denton Counties (the northwestern-most counties in the non-attainment area). Table 3b shows the 4th highest 8-hour ozone values at the monitoring sites in these counties.

Table 3b. 4th Highest 8-Hour Ozone Values In 2003-2006 In Tarrant, Denton, and Parker Counties.

Monitor	2003	2004	2005	2006	4-Year Linear Trend (ppb change/year)
Denton	94	92	94	100	2.0
FW NW	96	90	99	95	0.6
Keller	97	92	98	94	-0.3
Parker	87	79	97	89	2.4
Eagle Mountain	96	87	103	98	2.2
Grapevine	95	92	94	95	0.2
Arlington	85	84	93	85	0.9
				MEAN	**1.14 ppb increase/yr**

Table 3b shows that the increase in 4th highest ozone values is particularly strong in Tarrant, Denton, and Parker counties, with an average annual increase of 1.1 ppb/year in the 4-year period from 2003 to 2006.

The attainment status of the DFW area is determined by the highest design value at any of the monitors in the 9-county area. Table 3c shows the monitor locations from 2000-2006 that had the highest design values.

Table 3c. Locations of Highest Design Values in 9-County Area

Year	Monitor	County
2000	Denton C56	Denton
2001	Denton C56	Denton
2002	Denton C56	Denton
2003	Keller C17	Tarrant
2004	Keller C17	Tarrant
2005	Fort Worth NW C13	Tarrant
2006	Eagle Mountain Lake C75	Tarrant

Over the last 7 years the monitors with the highest design values have consistently been in the northwestern-most counties. Effective NOx reduction strategies will have to focus on the sources that particularly affect monitors in this part of the 9-county nonattainment area. Otherwise, the overall DFW-area design value will not reach 84 ppb by the attainment date.

The recent short-term ozone trends shown in Tables 3a and 3b and in the data provided by the State in Figure 3-5 of the Submitted SIP demonstrate that the 4th highest 8-hour ozone values are on an upward trend across much of the DFW area. Tables 3b and 3c show that the problem is particularly acute in the northwestern part of the DFW area, where ozone is increasing at an annual rate of 1.1 ppb/year. The weight of evidence of recent ozone trends shows that ozone design values are *increasing* across much of the DFW area and that the area will not achieve attainment by 2009.

3.8 Conclusions - Weight of Evidence

Evaluations of the corroborative analysis and weight of evidence demonstration in the Submitted SIP show conclusively that the Dallas-Fort Worth Nonattainment Area will not be in compliance with the 8-hour ozone standard by the attainment date and that numerous locations, most likely in Denton and Tarrant Counties, will have design values above 84 ppb.

Specifically, this evaluation shows that:

- Two of the monitors have modeled design values that EPA guidance designates as failing by a "wide margin".
- EPA guidance indicates that when even 1 monitor fails by a wide margin, the weight of evidence determination "is far less likely" to be "sufficiently convincing" to conclude that an area will achieve attainment.
- Long-term trends indicate that ozone design values in the entire DFW area are falling over the last 16 years at a rate of approximately -0.28 ppb per year. The rate of decrease required to bring the current DFW ozone design value of 96 ppb down to the 84 ppb standard is -4.0 ppb per year, which is a rate an order of magnitude greater than the actual long-term trend.
- NOx reductions in DFW of 150 tpd and 21% from 1998-2003 produced no decrease in ozone design values. The Submitted SIP will provide NOx reductions from 2006-2009 of 60 tpd and 13%, significantly smaller than the earlier reductions. The NOx reductions in the Submitted SIP are clearly insufficient to provide the dramatic reductions in design values needed to get the DFW area into attainment.
- The 4th highest 8-hour ozone values at the Denton monitor increased in 2005 and 2006, and the 3-year design value increased at the monitor in 2006. In addition, the 3-year design values at the Eagle Mountain Lake monitor increased in 2005 and 2006. Ozone levels would have to drop at improbable rates in Tarrant County and Denton County to reduce the current design values at these monitors (95 and 96 ppb) to 84 ppb.

- Recent 4-year trends show that the 4th highest 8-hour ozone values at the 17 monitors across the DFW area are increasing at an average rate of approximately 0.5 ppb per year, from 2003 to 2006.
- The subset of monitors in the northwestern-most counties, Tarrant, Parker, and Denton, have ozone levels that are increasing at a rate of 1.1 ppb per year over the last 4 years. The monitors in Tarrant and Denton Counties were consistently the highest monitors in the 9-county area from 2000-2006.
- Taken as a whole, the weight across all these lines of evidence (long-term trends, short-term trends, previous NOx reduction efforts, and the trends in northwestern counties) shows without any doubt that the modest emissions reductions in the Submitted SIP will not even be close to sufficient to get the DFW area into compliance with the 8-hour ozone standard by the attainment date.

4.0 PHOTOCHEMICAL MODELING AND THE 1999 OZONE EPISODE

In addition to the specific problems with the photochemical modeling and the weight of evidence already discussed in this report, there are problems with the State's use of the August 13-22, 1999 episode in the photochemical modeling to demonstrate attainment. These problems reinforce EPA making a determination that the Submitted SIP is substantially insufficient.

4.1 EPA Guidance on the Selection of Ozone Episodes

In "Guidance on the Use of Models and Other Analyses in Attainment Demonstrations for the 8-hour Ozone NAAQS" [EPA-454/R-05-002, October 2005] (EPA Attainment Guidance Document), EPA sets out very specific guidance for the selection of ozone episodes for SIP photochemical modeling. It is critical to note that the photochemical modeling in the Submitted SIP is based on one ozone episode from August 13-22, 1999. On Page 2 of the Guidance Document, and then on Page 58, EPA states:

> "This guidance applies to all locations required to submit a State Implementation Plan (SIP), or Tribal Implementation Plan (TIP) revision with an attainment demonstration designated to achieve attainment with the 8-hour ozone NAAQS. Areas required to submit an attainment demonstration are encouraged to follow the procedures described in this document."

> "Historically, ozone attainment demonstrations have been based on a limited number of episodes consisting of several days each. In the past, the number of days modeled has been limited by the speed of computers and the ability to store the model output files. With the advancement in computer technology over the past decade, computer speed and storage issues are no longer an impediment to modeling long time periods. In fact, several groups have recently modeled entire summers or even full years."

EPA explains the technical benefits the modeling long time periods, and lays out the minimum criteria for episode selection. On Page 57 EPA states:

> "Additionally, recent research has shown that model performance evaluations and the response to emissions controls need to consider modeling results from long time periods, in particular full synoptic cycles or even full ozone seasons."

> "At a minimum, four criteria should be used to select episodes which are appropriate to model:
>
> 1) Choose a mix of episodes reflecting a variety of meteorological conditions which frequently correspond with observed 8-hour daily maxima > 84 ppb at multiple monitoring sites.
>
> 2) Model periods in which observed 8-hour daily maximum concentrations are close to the average 4th high 8-hour daily maximum ozone concentrations.
>
> 3) Model periods for which extensive air quality/meteorological data bases exist.
>
> 4) Model a sufficient number of days so that the modeled attainment test applied at each monitor violating the NAAQS is based on multiple days (see section 11.1.4)."

It is important to note EPA's use of the plural words "summers", "years", "cycles", "seasons", “episodes”, and “periods” when specifying the minimum criteria for selecting appropriate episodes for photochemical modeling. This is in sharp contrast to the single episode that forms the basis of the SIP prepared by the State of Texas.

In the next section of the Guidance Document, “11.1 - What Are the Most Important Criteria for Choosing Episodes," EPA reiterates its guidance about episode selection. On Page 58, EPA states:

> “Choose a mix of episodes which represent a variety of meteorological conditions which frequently correspond with observed 8-hour daily maxima exceeding 84 ppb...This criterion is important, because we want to be **assured** that a control strategy will be effective under a variety of conditions leading to elevated ozone concentrations.”

By failing to model a mix of different ozone episodes or an entire ozone season, the attainment demonstration fails to follow minimum EPA modeling guidance. By EPA's own guidance, attainment demonstrations based on a single episode cannot provide "assurance" that any control strategy will be effective under a variety of conditions leading to elevated ozone concentrations.

4.2 EPA "Approval" of the August 1999 Ozone Episode

In the Submitted SIP, the State of Texas provided the rationale for the selection of the single August 1999 episode (Submitted SIP, pp. 2-3 to 2-7). On Page 2-7, the State writes:

> "As a result of these considerations, the August 13-22, 1999, ozone episode was selected for one hour ozone modeling for the DFW area. Additional review of the event confirmed that the August 13-22, 1999, episode was also typical of eight-hour ozone episodes. On February 1, 2005, TCEQ staff met with EPA Office of Air Quality Planning and Standards (OAQPS) and Region 6 staff and jointly agreed that the August 13-22, 1999, episode provided an acceptable platform for eight-hour ozone SIP development."

While it may be true that EPA approved the use of the August 1999 episode on February 1, 2005, and supported it again in a letter in June 2005, EPA has long maintained (and the Courts have upheld) the ability of the Agency to periodically update guidance. The Guidance Document was released in October 2005, 9 months after EPA approval of the August 1999 episode in February 2005. The release of the October 2005 document established new guidance that the State of Texas should have considered and taken steps to address in its SIP efforts. It has now been 1.5 years between the release of the October 2005 document and the submittal of the SIP to EPA in June 2007. There was more than sufficient time for the State to add additional ozone episodes to the modeling effort to build assurance that the control strategy in the SIP would be effective at reducing ozone under a variety of conditions.

Furthermore, nothing in the February 1, 2005 meeting between EPA and TCEQ prevented TCEQ from doing additional work and adding other ozone episodes to the DFW photochemical modeling effort. The State is trying to get away with absolutely minimal effort, 1.5 years after guidance contradicting its approach was issued by EPA.

In comments submitted by EPA in December 2006 to the State regarding the Proposed SIP (Submitted SIP, Response to Comments, pp. 62-63), EPA itself requested that the modeling analysis in the SIP be broadened to include,

> "Further discussion of other modeling episodes", as well as, "An evaluation of sub-sets of days that were near the ozone design value."

The State completely disregarded the December 2006 requests by EPA to broaden the modeling analysis, and instead responded with this statement (Submitted SIP, Response to Comments, p. 63):

> "Other episodes are not included in this SIP revision because they did not perform as well as the 1999 episode."

This was the State's entire response to EPA's request.

4.3 Conclusions - Ozone Episode Selection

EPA's most recent guidance clearly indicates that the use of multiple ozone episodes in a photochemical attainment demonstration is vital to provide assurance that the control strategies and emissions reductions in an attainment demonstration are robust and valid into the future. There was ample time (1.5 years) between the issuance of the October 2005 Guidance Document and the submittal of the SIP in June 2007 for the State to incorporate additional modeling episodes into the attainment demonstration. In addition, there was nothing preventing the State from adding episodes earlier than this, prior to or after the February 2005 meeting with EPA. At a minimum, the State could incorporate the two 2005 episodes recently developed and modeled by the University of Houston and Rice University team of researchers lead by Dr. Daewon Byun (Byun et al 2006).

The fact that the DFW SIP is based on only one episode from 1999, combined with the State's refusal on its own volition to make the SIP stronger by adding other episodes, and the State's resistance to following the minimal guidance of the October 2005 EPA Guidance Document over the last 1.5 years, and the State's rejection of the December 2006 EPA request to expand the modeling analysis - all these factors illustrate that the SIP was on very weak ground technically on the day it was submitted in June 2007. With this weakness, EPA should and could only have considered approval the SIP if both the photochemical modeling showed all monitors in compliance with the standard and the weight of evidence determination assured attainment with the ozone standard. Neither of these conditions has been satisfied in the SIP that EPA is currently reviewing.

5.0 REASONABLY AVAILABLE CONTROL MEASURES

The Clean Air Act requires States to provide for the implementation of all reasonably available control measures (RACM) in SIPs (42 U.S.C. 7502, Section 172 (c) (1)). The lack of implementation of RACM requires disapproval by EPA of state SIPs.

> "(c) Nonattainment Plan Provisions.- The plan provisions (including plan items) **required** to be submitted under this part shall comply with each of the following:
> (1) In general.- Such plan provisions shall provide for the implementation of **all** reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology) and shall provide for attainment of the national primary ambient air quality standards."

There are numerous reasonably available control measures that the State has failed to adopt in the Submitted SIP. This failure alone, irrespective of the problems with the photochemical modeling and the weight of evidence, is reason for EPA disapproval of the DFW SIP.

A set of additional reasonably available control measures are proposed in this section of the report. They will lower ozone concentrations throughout DFW and make attainment with ozone standard possible. None of these emission reduction strategies are new. In the past, they have been proposed, discussed, or implemented by local, regional, and state governmental entities. Most of them have been implemented, either partially or completely, in Texas or other locations. This report will demonstrate that these emissions reductions are obviously reasonably available control measures that are technically and economically feasible.

The numerous documents referenced in this section of the report are available on-line for review at http://engr.smu.edu/~aja/2007-ozone-report/index.html.

5.1 On-Road Mobile Sources

On-road mobile sources (i.e. cars, trucks, buses, etc) are collectively the largest NOx sources in the DFW area. Emission standards for on-road motor vehicles are generally regulated by the Federal Government, but the State has a wide range of options to reduce emissions from these sources.

One of the most important tools available to the State to regulate on-road motor vehicle emissions is regulation of highway speed limits. Vehicles traveling at 75 or 85 mph emit substantially more NOx per mile traveled than vehicles traveling 55 or 65 mph. In recognition of this fact, the speed limits on DFW area highways were reduced from 70/65 mph to 65/60 mph in 2001. The NCTCOG estimated that the 65/60 mph program reduced NOx emissions by approximately 5.42 tpd and VOC emissions by 1.1 tpd (NCTCOG 2007).

This report proposes that the success of the 65/60 program be expanded with further speed limit reductions on DFW highways to 55 mph as part of the SIP. The NCTCOG estimated that an area-wide 55 mph speed limit would produce additional emission reductions of 17.24 tpd for NOx and 2.92 tpd for VOC (NCTCOG 2007).

In response to a comment on the Proposed SIP by an individual advocating speed limit reductions, the State explained the reason why emissions reductions from speed limit reductions were not considered (Submitted SIP, Response to Comments, p. 16).

> "The commission and the TxDOT are prohibited by statute from making any changes to the speed limit as an emissions reduction strategy. In 2003, the 78th Texas Legislature removed authority for the TxDOT to prescribe speed limits for environmental purposes....The commission made no changes to the SIP as a result of this comment."

It is fundamental to recognize that EPA is not currently reviewing
Governor Perry's SIP,
or Chairman White's SIP,
or TCEQ's SIP,
or TxDOT's SIP,
or the Legislature's SIP.

EPA is reviewing the SIP submitted by the **State of Texas,** as required by the federal Clean Air Act. For TCEQ or TxDOT to claim that they cannot control air emissions in Texas because of action or inaction by the Legislature is a non-argument. All of the various executive, legislative, and regulatory actors within the government of the State of Texas ought to be moving with proper haste and coordinating their actions to lower ozone concentrations in DFW and protect public health.

The DFW area was designated a non-attainment area for the previous ozone standard in November 1991. The DFW area was re-designated as nonattainment for the current ozone standard in April 2004. There has been ample time for the State of Texas to enact laws, adopt regulations, and establish procedures for dealing with the State's ozone problems.

On July 25, 2002, EPA Region 6 Regional Administrator Greg Cooke threatened to withhold approval of the DFW SIP under review at that time, unless the State adequately funded the TERP program. The TERP program was under-funded in 2002 by approximately $100 million (Federal Register, Vol. 67, No. 148, p. 49897, August 1, 2002). Given that SIP disapproval could have begun a sanctions clock and result in the loss of billions of dollars in federal highway money, the action by Mr. Cooke had an immediate and crystallizing effect on the various parts of Texas government. Funding for the TERP program was appropriated by the legislature, signed by the governor, and implemented by TCEQ in very short order after Mr. Cooke's July 2002 letter.

There is no doubt that similarly swift action by the government of the State of Texas could take place in the future, if EPA has the political courage to follow the law and determine that the DFW SIP is substantially inadequate.

The Texas Legislature has been in special session numerous times over the last 20 years. During the 1991, 2003, and 2005 special sessions, Texas Governors asked the Legislature to consider topics such as the establishment of a state lottery, allowing the Legislative Budget Board to meet by teleconference, and redistricting U.S. Congressional districts.

Surely, protecting the lives and health of children, the elderly, and the sick in Dallas-Fort Worth are worthy of the same level of focused attention by the government of the State of Texas.

5.2 Electric Generating Units

The Submitted SIP is planning to reduce emissions from power plants (electric generating units or EGUs) in the DFW area. These EGUs certainly contribute to the ozone problem and control of their NOx emissions is important.

However, emissions from EGUs throughout Texas, and especially those in east and central Texas, also impact ozone concentrations in DFW because of regional transport of ozone and ozone precursors. The State is not requiring the same levels of EGU NOx controls it has mandated for the Dallas-Fort Worth area or the Houston area to be applied statewide or in east and central Texas.

In October 2006, the North Texas Clean Air Steering Committee (NTCASC), a body consisting of DFW-area city and county elected officials along with business and citizen interests, passed a series of resolutions, many of them requesting specific action by the State on the DFW SIP (Submitted SIP, Response to Comments, p. 18-19). One of these resolutions states:

> "The resolution recommends that the commission propose a requirement that all major electric generation units in east and central Texas must meet fuel-specific emissions requirements comparable to those in place in the DFW and Houston-Galveston-Brazoria (HGB) nonattainment areas."

The State's response to the resolution (Submitted SIP, Response to Comments, p. 19) was:

> "These sources have already been addressed as part of Senate Bill 7 (76th Legislature). The electric generating facilities in east and central Texas were required to reduce NOx emissions by 50 percent from their 1997 levels by 2003. Modeling conducted as a part of the development of this SIP revision indicates that NOx reductions made inside the DFW nine-county region are far more effective toward attaining the ozone standard."

However, in another part of the Submitted SIP, the State admits that advanced controls at east and central Texas EGUs could have a major impact on reducing ozone concentrations in DFW (Submitted SIP, Response to Comments, p. 30):

> "Preliminary modeling indicated that HGB level NOx emissions specifications applied to electric generating facilities in east and central Texas may result in up to 1 ppb reduction at monitors within the DFW eight-hour nonattainment area. However, these sources were already addressed as part of Senate Bill 7 (76th Legislature), requiring electric generating facilities in east and central Texas to reduce NOX emissions by 50 percent from their 1997 levels by the year 2003."

The State is acknowledging that placing advanced controls on EGUs in east and central Texas could reduce ozone concentrations up to 1 ppb in DFW. Reductions of this amount would be enough to get the predicted 2009 design value at the Fort Worth NW monitor below 85 ppb and into compliance, and also to bring the Denton and Frisco monitors below the 88 ppb "wide margin" failure level.

One of the reasons stated by the State for not requiring lower emissions on east and central Texas EGUs is a supposed shortage in the supply of control technology to reduce NOx emissions (Submitted SIP, Response to Comments, p. 30):

> "The commission therefore determined during proposal that further reductions in emissions from these sources would limit the availability of vendors and control technology for other necessary control measures within the DFW nonattainment area and the required controls could not be implemented by the attainment date."

This rationale for not requiring stricter levels of controls is truly puzzling. In 2006, EPA promulgated the Clean Air Interstate Rule, which required reductions in NOx and SO_2 emissions from EGUs in 28 eastern and southern states, including Texas. In addition, a growing number of EGUs and industrial point sources nationwide are being required to install advanced NOx controls by state ozone, particulate matter, and regional haze SIPs. These advanced NOx controls include selective catalytic reduction (SCR) and low temperature oxidation (LoTOx). As with all professional engineering services, the completion dates on SCR installation projects slipped at some locations. But overall, the companies that manufacture and install SCR systems are meeting deadlines and dozens of SCR units and other forms of advanced NOx control are going on-line monthly. Statewide, Texas has approximately 300 EGUs potentially affected by NOx reductions in CAIR, less than 10% of the 28-state total.

Furthermore, the State's suggestion that it was time-constrained from acting on east and central Texas EGUs is without foundation. There was ample time in the 5.5-year period between the April 2004 designation of DFW as nonattainment for the 8-hour ozone standard and the end of the ozone season in 2009 for the promulgation of strong EGU NOx control regulations and the installation of advanced NOx control technology. Entire coal-fired power plants are built from the ground up in less than 5 years. The installation of an individual pollution control unit (like an SCR unit) at an EGU would certainly take

much less than this. Current experience nationwide at other EGUs affected by CAIR suggests 18-24 month timelines are reasonable expectations for even large SCR projects.

This report proposes that the SIP honor the request of the NTCASC and adopt NOx control regulations on EGUs in east and central Texas similar to those in effect for DFW and HGB. Controls at these levels would reduce NOx emissions region-wide by approximately 140 tpd (ENVIRON 2006). These reductions would help the DFW area get into attainment and have the additional benefit of helping the Tyler-Longview, San Antonio, Austin, Houston-Galveston-Brazoria, and Beaumont-Port Arthur areas in Texas stay or get into attainment.

5.3 Gas Pipeline Compressor Engines

The State of Texas has valuable natural gas deposits and other large deposits are found off-shore in the Gulf of Mexico. Natural-gas fired reciprocating internal combustion engines (IC Engines) and natural gas-fired turbines are used to operate compressors which provide the energy to move the natural gas in the pipelines from the point of production to the point of use. When examining NOx emissions from gas pipeline compressor engines, it's important to understand that the work is performed by the compressors, which by themselves produce no emissions. The emissions come from the exhaust of the IC engines, which are fueled with a small amount of the readily available natural gas.

Traditionally, NOx emission reductions from gas pipeline compressor engines have been achieved by advances in engine design, and in some cases, by the installation of catalytic and noncatalytic reduction techniques, such as SNCR, SCR, and NSCR. However, in areas like DFW where air quality concerns are important, another option is available to pipeline operators.

Over the last 20 years compressor manufacturers have made great advances in the design and operation of electrically-powered pipeline compressors. The power to run the compressors does not come from IC engines and the combustion of natural gas, which produced NOx emissions, but rather from electrically-powered motors. The electrification of the natural gas production and distribution pipeline systems in Texas has the potential to deliver huge reductions in NOx emissions in DFW and throughout all of east and central Texas, where the ozone problems are most acute.

In remote areas without ready access to electricity, the use of natural gas-fired compressor engines makes sense and is the most cost effective and often the only way to produce the power needed to run the pipeline compressors. However, access to electricity is neither a concern in the DFW metroplex nor at most locations in east and central Texas. The cost of providing electricity to production or distribution compressors that are presently relying on natural gas is offset by the fuel savings of not having to burn fuel to run the engines. Costs for electrification are also offset by reduced maintenance costs when switching from a combustion engine to an electric motor to run the compressor.

On its website, the Interstate Natural Gas Association of America makes this assessment of the potential for compressor electrification (INGAA 2007):

> "Electric motor/centrifugal compressor - In this package the centrifugal compressor is driven by a high voltage, electric motor. One advantage of electric motors is they need no air emission permit since no hydrocarbons are burned as fuel. However, a highly reliable source of electric power must be available, and near the station, for such units to be considered for an application."

Similarly, the Williams natural gas pipeline company writes about compressor electrification with this analysis (Williams 2007):

> "The compressor is driven by either a gas turbine, electric motor, or reciprocating engine.
>
> A gas turbine is very similar to a jet engine found on an airplane except that instead of using the thrust to push the airplane, the jet turns a large fan to spin or rotate the compressor. An electric motor is a larger version of the electric motors you see every day just as the reciprocating engine is similar to your car engine just larger. The gas turbine and reciprocating engines typically use natural gas from the pipeline, where the electric motor uses power from an electric transmission line.
>
> **Selection of this piece of equipment is based on air quality, available power, and the type of compressor selected. Typically electric motors are used when air quality is an issue.** Gas turbines are used when electric power is not readily available. Reciprocating engines are used when smaller compressors are needed."

When designing a new compressor station in New Jersey in 2005, Williams elected to use electric motor compressors because of air quality concerns (Williams 2007):

> "Four main buildings are proposed as part of the new facility:
>
> - A compressor building to house the compressors. The compressor drive package will consist of two 5,000 horsepower electric motors each driving a reciprocating compressor.
> - A one-story switchgear building for electric power
> - A two-story auxiliary/office building
> - A one-story control building
>
> The project has been designed to minimize any adverse impact to surrounding communities. **The facility will be powered by quiet, non-polluting electric motors.**"

For the sake of brevity, I'll limit my examples of compressor electrification to these two recent statements by pipeline concerns. There are numerous other examples of government entities, pipeline companies, and compressor manufacturers who have endorsed or are using electric motors to operate pipeline compressors, especially in areas where air quality problems exist (Oliver and Samotyi 1999).

On May 23, 2007, the day TCEQ adopted the Submitted SIP, public testimony and documents presented to the Commissioners revealed that the State's emissions inventory for DFW may have seriously undercounted the number of IC engines operating production or distribution compressors, perhaps by a factor of 10 or more. This testimony suggested that hundreds or perhaps thousands of point sources may not have been included in the already flawed photochemical modeling of the Submitted SIP. Public testimony also revealed that this massive undercount of engine numbers and engine emissions likely extends outside of DFW to the emissions inventories in east and central Texas. TCEQ is beginning to work on corrections to the engines emissions inventory and has a public meeting scheduled in Arlington on July 9, 2007, to discuss the issue.

Given the gross error in the submitted engines emissions inventory, it is difficult to know exactly what emissions reductions could be achieved from NOx controls and electrification of the gas compressor fleet.

However, if the current emissions inventory, industry comments to the Proposed SIP, and reports by HARC are used to develop a conservatively low estimate, compressor engine NOx emissions in the DFW non-attainment area are approximately 16 tpd, and emissions from on-shore units in all of east and central Texas outside of DFW are approximately 150 tpd. With the identified problems in the emissions inventory, current efforts to fix the significant undercount are expected to only increase these emissions estimates.

This report proposes that the SIP include regulations for NOx emissions reductions of 90% from current levels across the entire natural gas compressor engine fleet in DFW and east and central Texas. These regulations should cover all gas compressor engine units (rich burn, lean burn, and turbines; small, medium, and large HP), based on electrification of much of the fleet. These regulations would provide approximately 14 tpd of additional NOx reductions within DFW, and 135 tpd across east and central Texas. Since IC engines are also VOC emission sources, from unburned fuel and incomplete combustion product emissions, an electrification program would have the benefit of reducing VOC emissions by approximately 2 tpd in DFW and 20 tpd in east and central Texas.

These reductions would help the DFW area get into attainment, and have the additional benefit of helping the Tyler-Longview, San Antonio, Austin, Houston-Galveston-Brazoria, and Beaumont-Port Arthur areas in Texas stay or get into attainment. These reductions are achievable with a combination of engine replacement or retrofit, the installation of control technology like SCR, or electrification of the compressor units.

The State has previously implemented regulations that established 90% NOx emissions reductions based on the electrification of internal combustion engine sources. In 1999, the State adopted rules that required the owners and operators of airports in DFW to reduce emissions from ground support equipment (GSE) by 90% (24 Texas Register 11938, Chapter 114, Rule Log Number 1999-055E-114-AI). The rule, and the associated agreed orders and MOA in 2001, were based on the expectation that most of the existing GSE

units (which were at that time powered by gasoline, diesel, and gas IC engines) could be replaced over a series of years by electric-motor powered units, effectively providing 100% emissions reductions for each vehicle or machine replaced. The GSE electrification program was estimated to reduce NOx emissions by 6 tpd in DFW. In the 1999 GSE rule, the State wrote:

> "At the request of the steering committee, the commission developed an airport GSE electrification strategy in the DFW nonattainment area which requires the conversion of GSE to electric-powered GSE at the airports which have the most air carrier operations. After many meetings with the affected airlines and airports, the commission has made it possible for owners and operators of GSE to either meet a 100% electrification goal or meet an emission reduction goal of 90% by any alternative measure."

The State should follow the regulatory precedent it set with the GSA rule and develop a 90% NOx reduction program for the gas pipeline compressor engines in DFW and east and central Texas. Doing so would provide even greater reductions in NOx than were obtained with the GSE program and help get DFW into attainment with the ozone standard.

5.4 Cement Kilns

According to the 2003 TCEQ Point Source Emissions Inventory, the cement companies in Ellis County are 3 out of 223 major industrial and utility point source accounts in the entire DFW 9-county area (1.3%). In contrast, these 3 cement plants accounted for 49% of the NOx emissions from the major point sources, as well as 79% of the SO_2 and 27% of the PM emissions. In 2003, these three cement plants emitted 27 tpd of NOx. For comparison, the cement plants emitted 26 tpd of NOx in 1999, and 27 tpd in 1996 (EPA 2007).

The Submitted SIP is requiring that the cement plants reduce emissions by 9.69 tpd. This means that the cement plants are collectively expected to reduce their emissions by 36%. The State is basing its 36% reduction strategy on 9 of the 10 cement kilns at the cement plants using selective non-catalytic reduction technology (SNCR) or equivalent controls and one of the cement kilns (TXI #5, the largest cement kiln in Region VI) not implementing any post-combustion NOx controls.

The State defends its 36% reduction strategy throughout the Submitted SIP by claiming that more advanced levels of control are either technologically unavailable or economically unreasonable. There are numerous faults with the State's analysis of advanced NOx control technology for the cement plants in Ellis County. However, rather than presenting a line-by-line rebuttal of the State's analysis, this section of the report will focus on the most recent and growing evidence regarding NOx controls at cement plants, including material that became available only after the State proposed its "cement kiln cap" approach in late 2006.

The State's arguments defending the 36% reduction strategy (Submitted SIP, Chapter 4 and Response to Comments) include statements such as:

> "In most cases, the commission anticipates that the source cap limitations will be attainable with SNCR and will not require costly and time consuming research and development of other technologies."

> "The Cement Kiln Study describes SCR and LoTOx technologies, which can reduce NOx emissions by roughly 80 to 85 percent; however, neither has been applied to wet kilns anywhere in the world. Furthermore, neither has been sufficiently tested on cement kilns similar in design and feed materials to Ellis County kilns to conclude with certainty that those levels of reductions are achievable..."

The blue-ribbon panel of outside experts that wrote the Cement Kiln Study (ERG Inc., 2006) concluded that SCR was available technology because it had been tested and implemented full-scale in Europe and because it had proven effective on similarly fired industrial and utility units in the U.S., like coal-fired power plants and waste incinerators (Submitted SIP, Cement Kiln Study, Appendix I, Tables 1-1 to 1-16 and Chapter 4.0, July 14, 2006). These cement-industry insiders unanimously concluded that the physical and chemical characteristics of cement kiln flue gases from the cement plants in Ellis County made the gases amenable to NOx reductions with SCR and LoTOx.
In addition to this positive assessment of cement kiln NOx control with SCR by the authors of the Cement Kiln Study in July 2006, there have been more recent developments in cement kiln NOx controls that further demonstrate its availability to reduce NOx emissions from cement kilns.

5.4.1 CEMEX Permit Application

CEMEX is the third largest cement manufacturer in the world and it operates numerous cement plants across the U.S. and in Texas. CEMEX submitted a permit application to the State of Florida on October 12, 2006, for the construction of a cement kiln in Hernando County, Florida. The cement kiln was planned for an area that is in attainment with the ozone standard, in a State where every county is in attainment. CEMEX had to perform a BACT analysis in the application, including an evaluation of the effectiveness of SCR technology (CEMEX 2006). This application was filed just weeks before publication by the State of Texas of the Proposed DFW SIP in December 2006, so it is possible that its contents were unknown to the State or EPA at that time.

In the State of Texas's response to comments received on the Proposed DFW SIP (Submitted SIP, Response to Comments, p. 27), the State wrote:

> "The commission could find no evidence to support Downwinders claim that CEMEX “admitted” that SCR has been proven effective in cement plants."

Because CEMEX's permit application represents an important and recent assessment by a major player in the U.S. cement industry on the applicability of SCR technology, copies of the relevant pages are copied here for EPA review.

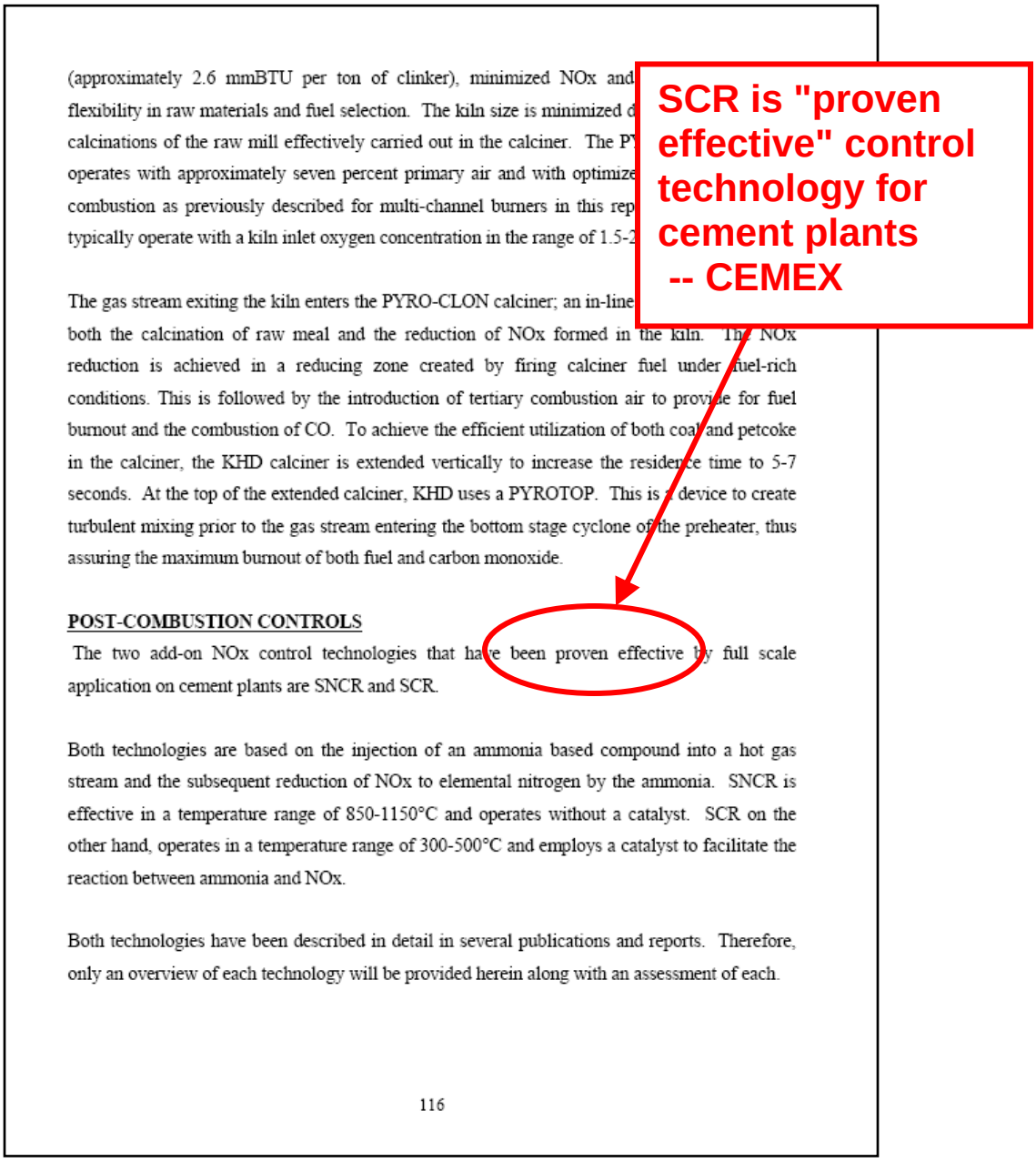
REPORT IN SUPPORT OF
AN APPLICATION FOR A PSD
CONSTRUCTION PERMIT REVIEW

CEMEX, INC.
Kiln 3 Project
Brooksville Cement Plant
Hernando County, Florida

October 12, 2006

On Page 116 of the permit application, CEMEX describes SCR as a "proven effective" control technology for cement plant NOx control:

> "The two add-on NOx control technologies that have been **proven** effective by full scale application on cement plants are SNCR and SCR. Both technologies are based on the injection of an ammonia based compound into a hot gas stream and the subsequent reduction of NOx to elemental nitrogen by the ammonia. SNCR is effective in a temperature range of 850-1150°C and operates without a catalyst. SCR on the other hand, operates in a temperature range of 300-500°C and employs a catalyst to facilitate the reaction between ammonia and NOx."



(approximately 2.6 mmBTU per ton of clinker), minimized NOx and
flexibility in raw materials and fuel selection. The kiln size is minimized d
calcinations of the raw mill effectively carried out in the calciner. The PY
operates with approximately seven percent primary air and with optimize
combustion as previously described for multi-channel burners in this rep
typically operate with a kiln inlet oxygen concentration in the range of 1.5-2

The gas stream exiting the kiln enters the PYRO-CLON calciner; an in-line
both the calcination of raw meal and the reduction of NOx formed in the kiln. The NOx reduction is achieved in a reducing zone created by firing calciner fuel under fuel-rich conditions. This is followed by the introduction of tertiary combustion air to provide for fuel burnout and the combustion of CO. To achieve the efficient utilization of both coal and petcoke in the calciner, the KHD calciner is extended vertically to increase the residence time to 5-7 seconds. At the top of the extended calciner, KHD uses a PYROTOP. This is a device to create turbulent mixing prior to the gas stream entering the bottom stage cyclone of the preheater, thus assuring the maximum burnout of both fuel and carbon monoxide.

POST-COMBUSTION CONTROLS

The two add-on NOx control technologies that have been proven effective by full scale application on cement plants are SNCR and SCR.

Both technologies are based on the injection of an ammonia based compound into a hot gas stream and the subsequent reduction of NOx to elemental nitrogen by the ammonia. SNCR is effective in a temperature range of 850-1150°C and operates without a catalyst. SCR on the other hand, operates in a temperature range of 300-500°C and employs a catalyst to facilitate the reaction between ammonia and NOx.

Both technologies have been described in detail in several publications and reports. Therefore, only an overview of each technology will be provided herein along with an assessment of each.

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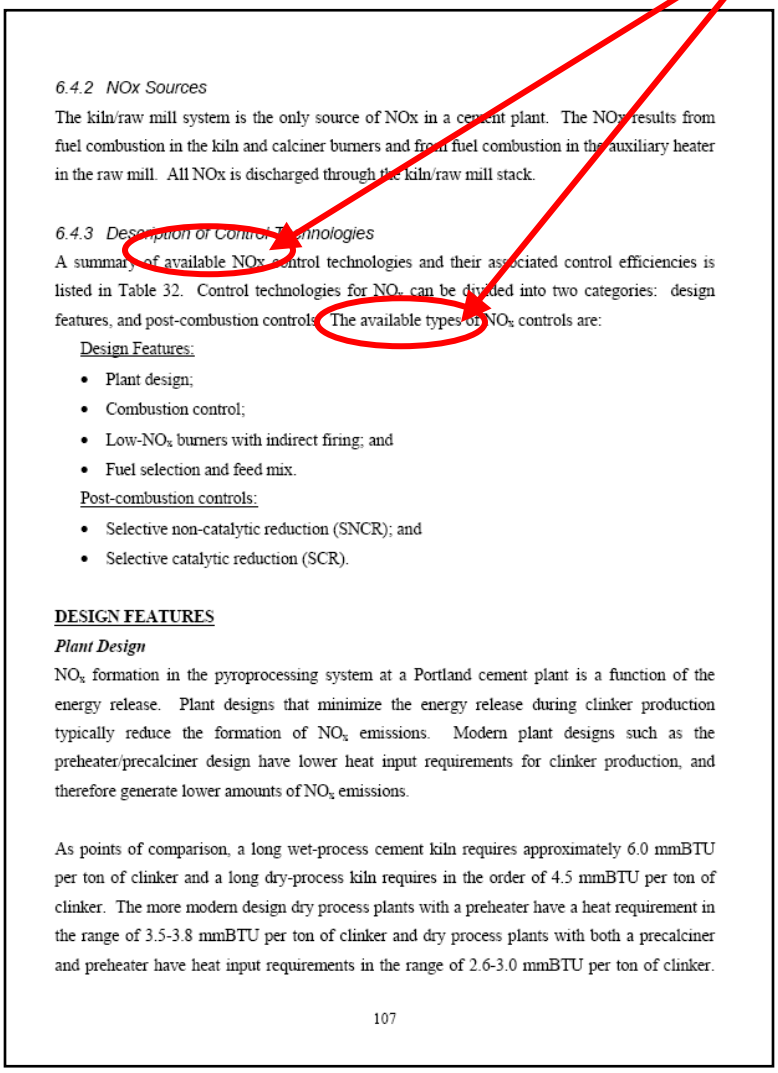
SCR is "proven effective" control technology for cement plants -- CEMEX

On Page 107 of the permit application, CEMEX describes SCR as currently "available" NOx control technology for cement plants:

"6.4.3 Description of Control Technologies
A summary of **available** NOx control technologies and their associated control efficiencies is listed in Table 32. Control technologies for NOx can be divided into two categories: design features, and post-combustion controls. The **available** types of NOx controls are:
Design Features:
• Plant design;
• Combustion control;
• Low-NOx burners with indirect firing; and
• Fuel selection and feed mix.
Post-combustion controls:
• Selective non-catalytic reduction (SNCR); and
• Selective catalytic reduction (SCR)."

SCR is "available NOx control technology" for cement plants -- CEMEX



6.4.2 NOx Sources

The kiln/raw mill system is the only source of NOx in a cement plant. The NOx results from fuel combustion in the kiln and calciner burners and from fuel combustion in the auxiliary heater in the raw mill. All NOx is discharged through the kiln/raw mill stack.

6.4.3 Description of Control Technologies

A summary of available NOx control technologies and their associated control efficiencies is listed in Table 32. Control technologies for NO_x can be divided into two categories: design features, and post-combustion controls. The available types of NO_x controls are:

Design Features:

- Plant design;
- Combustion control;
- Low-NO_x burners with indirect firing; and
- Fuel selection and feed mix.

Post-combustion controls:

- Selective non-catalytic reduction (SNCR); and
- Selective catalytic reduction (SCR).

DESIGN FEATURES

Plant Design

NO_x formation in the pyroprocessing system at a Portland cement plant is a function of the energy release. Plant designs that minimize the energy release during clinker production typically reduce the formation of NO_x emissions. Modern plant designs such as the preheater/precalciner design have lower heat input requirements for clinker production, and therefore generate lower amounts of NO_x emissions.

As points of comparison, a long wet-process cement kiln requires approximately 6.0 mmBTU per ton of clinker and a long dry-process kiln requires in the order of 4.5 mmBTU per ton of clinker. The more modern design dry process plants with a preheater have a heat requirement in the range of 3.5-3.8 mmBTU per ton of clinker and dry process plants with both a precalciner and preheater have heat input requirements in the range of 2.6-3.0 mmBTU per ton of clinker.

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5.4.2 Linero et al 2007 Report

In addition to the CEMEX permit application, another important and recent development regarding cement kilns is the successful first year of operation of the full-scale SCR unit at the Cementeria di Monselice cement plant in northern Italy, installed in June 2006. In the Submitted SIP, the State assessed SCR technology with statements such as these (Submitted SIP, Response to Comments):

> "No SCR or LoTOx units are operating on cement kilns anywhere in the U.S. The commission does not consider either SCR or LoTOx to be demonstrated technologies for the cement kilns in Ellis County."
>
> "Clearly, SCR and LoTOx are commercially available--they are in use on numerous types of industrial equipment. However, neither SCR nor LoTOx has been applied to wet process cement kilns, and only SCR has even been attempted on dry process cement kilns, with ambiguous results. Little technical information is available on these SCR applications."

Mr. Al Linero, P.E., of the Florida Department of Environmental Protection, visited and has been in close communication with officials at the Monselice cement plant over the last year. He co-authored a collaborative report on the SCR installation entitled

"*High Dust SCR Succeeds at Cementeria di Monselice*"

that he presented on June 26, 2007 at the Air and Waste Management Association Annual Conference and Exhibition in Pittsburgh, PA. The report was co-authored by a cement company official, an SCR manufacturer, and it was motivated by plant efforts to develop good public relations with local and regional governments and regulators. The Linero et al report is the only collaborative study written about the Italian facility, with authorship representing government, a cement company, and a control technology engineer, and oversight by local and regional environmental regulators (Linero et al 2007a, Linero et al 2007b).

The complete paper by Linero et al is available on the website of references for this report. The Conclusions are repeated here because they tell an effective story now that the plant has just completed its first year of full-scale SCR operations:

> "CONCLUSIONS
> The SCR installation has proven its multi-pollutant control capabilities. Beside the extremely high and efficient NOx-removal capabilities, NH_3 present in flue gas from raw material is completely used in the SCR process, thus considerably lowering the aqueous ammonia consumption, the related operating cost, a fine particulate precursor and potential odorant. In addition, 75 % oxidation of VOC is recorded. Almost all ozone precursors (NO_X and VOC) can be eliminated from the stack emissions of Cementeria di Monselice with the installed SCR process. These features will enable the cement industry to make use of a much wider range of raw materials and fuels whilst maintaining applicable emission standards and minimizing impacts on the environment.

SCR installation at Cementeria di Monselice at a glance:
Operating Time as end of October 06: > 3,600 h
Availability: 100%
NOx removal efficiency: up to 97%
NH_3 emissions before SCR was in operation 20 - 50 mg/m^3
NH_3 after commissioning of the SCR < 1 mg/m^3
Savings in 25% NH_3(aq) consumption corresponding to 20 - 60 kg/h
VOC-oxidation: 75%
Other Benefits Less air toxics, less Odor
Indicative operating costs for 90% NOX-removal efficiency: 1 – 1.3 €/t clinker"

5.4.3 Cost Effectiveness

The SCR assessments by CEMEX in their late 2006 permit application, and the June 2007 report by Linero et al on the full-scale SCR operation at the Monselice cement plant are critical documents that support the conclusions of the July 2006 Cement Kiln Study experts that SCR can effectively reduce NOx emissions from the cement plants in Ellis County.

In addition to the assertions in the Submitted SIP about the technical feasibility of SCR, the State also attacks the cost effectiveness of advanced NOx control at the cement plants with SCR or LoTOx (Submitted SIP, Response to Comments). For example:

> "In terms of cost per ton of NOx emissions reduced, SNCR is more cost effective than SCR and LoTOx. Cost effectiveness estimates for SNCR presented in the cement kiln study range from $1,400 to $2,300 per ton of NOx. Cost effectiveness for SCR, on the other hand, was estimated to be considerably higher: **$1,600 to $5,500** per ton of NOx. LoTOx cost effectiveness estimates ranged from **$2,100 to $3,000** per ton. The commission considers the costs for SCR and LoTOx to be unacceptably high compared to the readily available alternative."

In these statements, the State made the surprising determination that costs of $1600 to $5500 per ton of NOx removed for SCR and $2100 to $3000 per ton of NOx removed for LoTOx were "unreasonably high". This contradicts the most recent guidance and practice in states with stubborn ozone reductions problems like California and Texas. For example, the State of Texas's own TERP program is paying for NOx reductions in nonattainment areas at costs up to $13,000 per ton (TCEQ 2006). A similar program in California is paying for NOx reductions up to $14,300 per ton (SCAQMD 2006). Outside of Texas and California, the State of Wisconsin recently published cost effectiveness guidelines for ICI units at up to $7000 per ton for its RACT, BART, and CAIR programs (Wisconsin 2007). In 2003, the State of Oklahoma developed cost effectiveness guidelines for the Central Oklahoma EAC at up to $10,000 per ton of NOx from EGUs (Oklahoma 2003).

5.4.4 Cement Kiln Impacts on Tarrant, Denton, Parker, and Wise Counties

In addition to attacking the technological feasibility and cost effectiveness of advanced NOx controls for the cement kilns, the State attempted to diminish the importance and potential impacts of requiring additional cuts in NOx emissions. One way they did this was by examining the impact of emissions reductions from the plants on average, across the entire DFW nonattainment area (Submitted SIP, Response to Comments, p. 59):

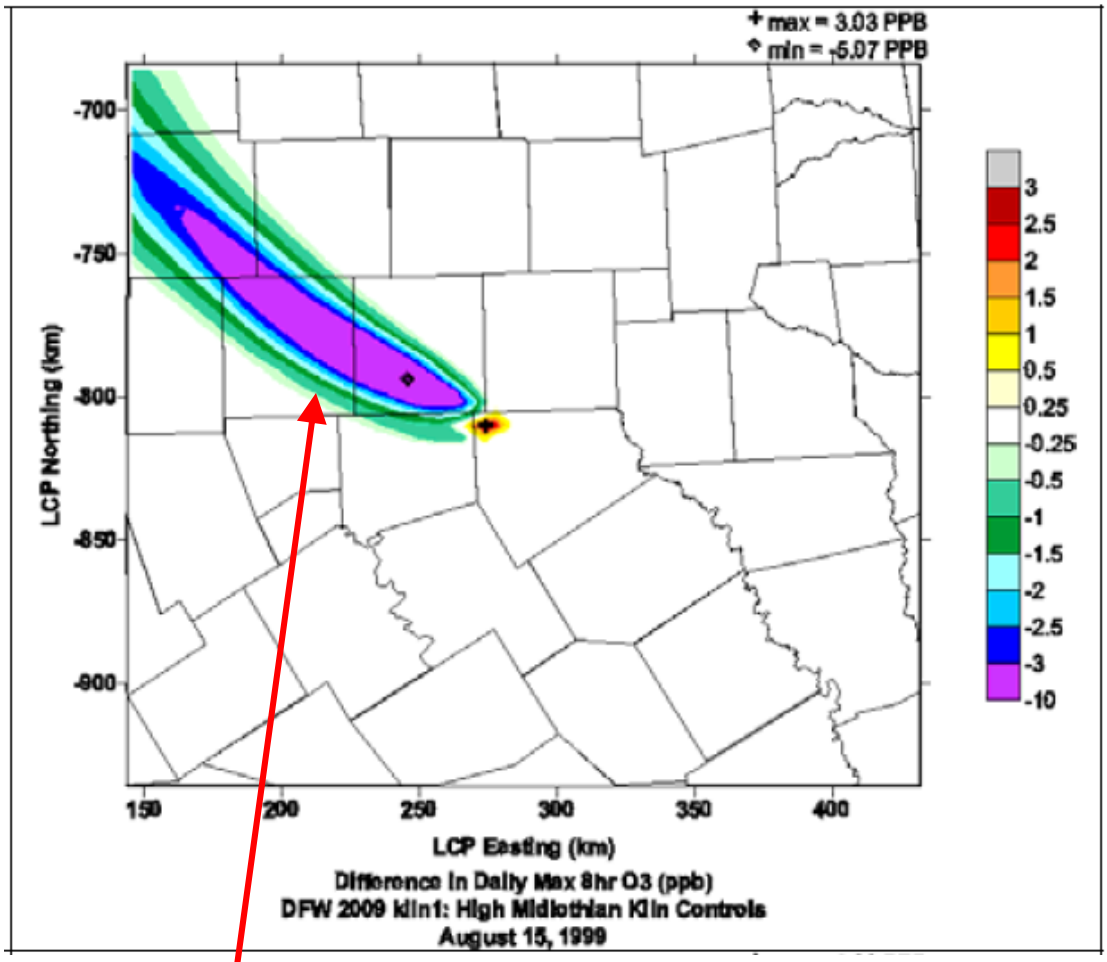
> "The commission also conducted two modeling sensitivity analyses based on the results of the Cement Kiln Study, included as Appendix I of the DFW eight-hour ozone attainment demonstration SIP. These modeling sensitivity analyses reflected a low level of control (assuming SNCR control and approximately 10 tpd of NOx reduction) and a high level of control (assuming SCR control and approximately 20 tpd of NO_X reduction), respectively. With 10 tpd of NO_X reduction, the DFW nine-county average response was -0.08 ppb. With 20 tpd of NOx reduction, the average response was -0.31 ppb."

Unlike automobile emissions in DFW, the three cement plants are located in very close proximity and their impacts on ozone are therefore concentrated in linear regions directly downwind from Midlothian. As the State very well knows, compliance with the ozone standard for a nonattainment area is determined by each monitor in an area showing attainment, not by the average ozone levels across all the monitors. The average impact of the cement kilns on average ozone levels across the 9-county area is *irrelevant*.

Across the DFW area, the most recently available (2006) ozone design values and 4th highest ozone concentrations show conclusively that individual monitors, especially those in Tarrant and Denton counties, are not going to be brought into attainment with the ozone standard unless targeted emission reductions substantially greater than those in the proposed SIP are adopted.

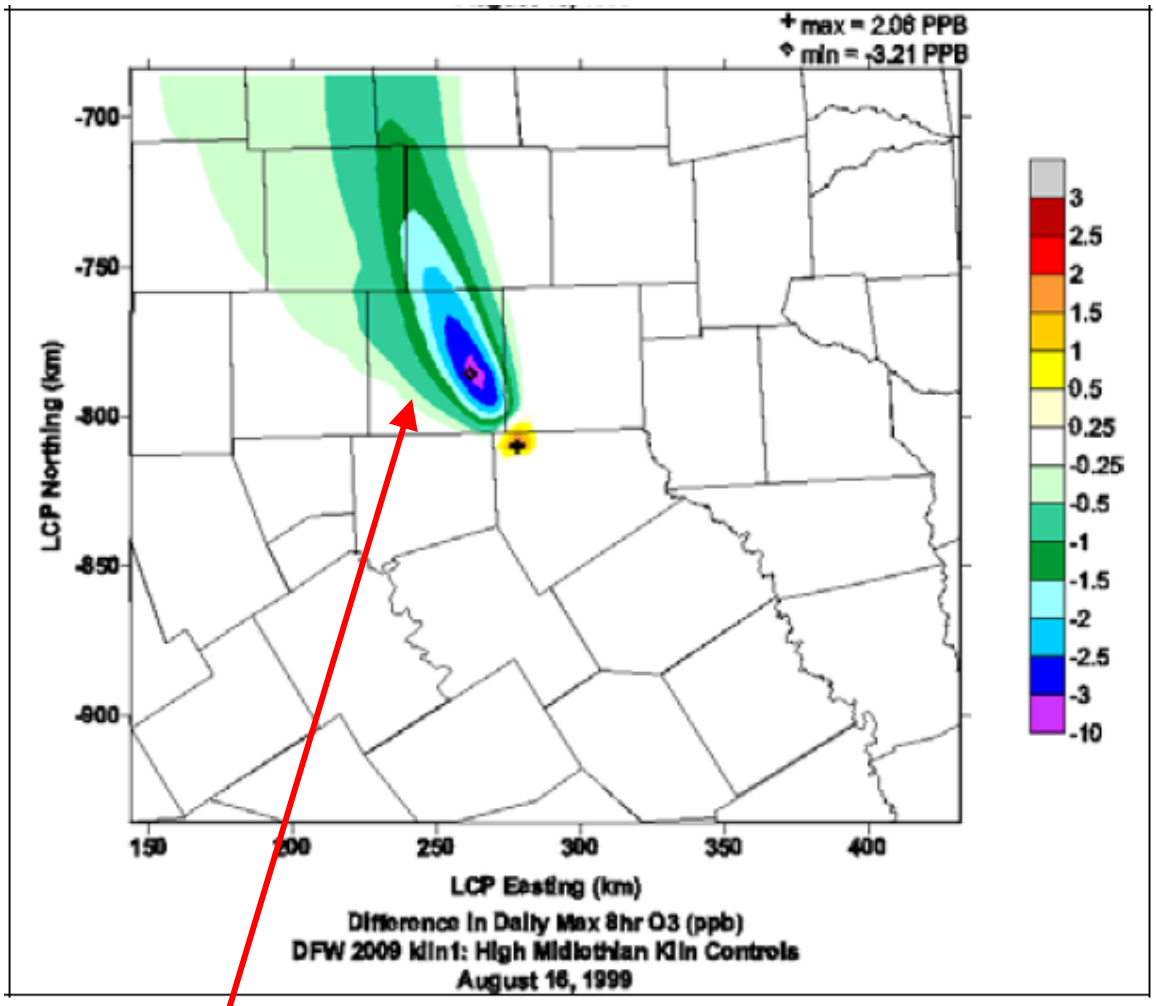
The State commissioned a February 22, 2006 study by outside experts to examine the potential impact of high level cement kiln NOx controls on individual monitors across the DFW nonattainment area (ENVIRON 2005). As the next two figures from the report show, adding advanced NOx control technology to the cement kilns could dramatically reduce 8-hour ozone concentrations in broad regions of Tarrant, Parker, Denton, and Wise counties, especially in the Cities of Arlington and Fort Worth.

Figure 5a. Benefit of 90% NOx Control on the Ellis County Cement Plants. (ENVIRON 2005, Figure 2, p. 5)



Ozone reduced 1 to 5 ppb across much of Tarrant, Parker, and Wise Counties by advanced NOx controls on the cement kilns on Day 1 of ENVIRON study.

Figure 5b. Benefits of 90% NOx Reductions from the Ellis County Cement Plants. (ENVIRON 2005, Figure 2, p. 5)



Ozone reduced 1 to 3 ppb across much of Tarrant and Denton Counties by advanced NOx controls on the cement kilns on Day 2 of ENVIRON study.

In addition to the ozone maps provided in the ENVIRON report, one of the most critical parts of their study was an analysis of the impacts of cement controls on individual grid locations in the DFW study area. They concluded that applying 90% NOx reductions to the cement kilns reduced concentrations by at least 1 ppb at 166 grid locations that were above the ozone standard in the DFW area. In contrast, applying only 40% reductions (which incidentally, is even more stringent than the 36% control strategy the State is adopting in the Submitted SIP) only resulted in 23 grids showing a 1 ppb decrease. ENVIRON's analysis demonstrates that the number of areas that would see dramatic improvements in air quality by applying 90% NOx reductions compared to 40% reductions would increase by a factor of 7.

Table 5a. Impacts of 90% and 40% NOx Reductions from the Ellis County Cement Plants
(ENVIRON 2005, Table 6, p. 13)

Table 6. Number of exceedance[1] grid cells that reduce the daily maximum 8-hour ozone by at least 1 ppb in DFW.

Scenario Run	2009 Future Base run44.fy2009.a1	High Cement Kiln Control run44.fy2009.a1.kiln1	Low Cement Kiln Control run44.fy2009.a1.kiln2
990815	---	0	0
990816	---	84	21
990817	---	48	2
990818	---	14	0
990819	---	18	0
990820	---	2	0
990821	---	0	0
990822	---	0	0
Totals	---	166	23

[1] Exceedance cells are 2009 baseline grid cells exceeding 85 ppb

The ozone maps and grid analysis performed by ENVIRON demonstrated the wide impact that cement kiln emissions have in large regions of the DFW area, and also the potential benefits of 90% NOx reductions. In addition to these broad analyses, ENVIRON also determined the impact on air quality at the 9 individual ozone monitoring locations that were operational in 1999. Their results indicate that 90% NOx reductions would have significant impacts at numerous monitors, especially those in Tarrant County.

Table 5b. Impacts at Official Monitoring Sites of 90% NOx Reductions from Ellis County Cement Kilns.
(ENVIRON 2005, Supplemental Table)

Daily Change (ppb)	High Kiln Control Scenario						Compared to 2009base.a1		
Site	990815	990816	990817	990818	990819	990820	990821	990822	Avg Change
Frisco C31	0.00	0.00	0.20	-0.20	0.00	0.00	0.00	0.00	0.00
Hinton C60	0.00	-0.10	0.20	-0.40	-0.10	0.00	0.00	0.00	-0.05
Dallas N C63	0.00	0.00	0.20	-0.30	-0.10	0.00	0.00	0.00	-0.03
Redbird C402	0.00	-0.30	0.20	-1.10	-0.10	0.10	0.00	0.00	-0.15
Denton C56	0.00	-0.20	-0.20	0.00	-0.10	0.00	0.00	-0.20	-0.09
Midlothian C94	-1.30	-0.30	-0.90	0.20	-1.40	0.60	0.00	0.30	-0.35
Arlington C57	0.00	-3.00	-1.10	-0.60	0.10	0.10	0.00	-3.20	-0.96
FtW NW C13	-1.30	-2.40	-0.90	0.00	0.00	0.00	0.00	-2.30	-0.86
FtW Keller C17	0.00	-1.20	0.50	0.00	-0.10	0.00	0.00	-0.20	-0.25
Average (ppb)	-0.29	-0.83	-0.31	-0.27	-0.20	0.09	0.00	-0.62	-0.30

2-3 ppb reductions possible on multiple days in Arlington and Fort Worth with 90% controls on kilns

ENVIRON showed that 90% NOx emission reductions from the cement plants had significant impacts on multiple days at several monitoring locations, including the Arlington C57 monitor and the Fort Worth NW C13 monitor. ENVIRON predicted that ozone levels at these monitors would drop 2-3 ppb with 90% controls on the kilns.

In this table, ENVIRON also calculated the average impacts of 90% cement kiln controls for an 8-day period, and also averages on each day for the 9 monitors across the DFW area overall. While these average values are interesting, it is vital to remember that compliance with the ozone standard is not determined with weekly or longer averages. Neither is compliance determined by averaging ozone concentrations across all the monitors in a region. Daily ozone values over 8-hour periods at individual monitors are used to determine compliance with the ozone standard. The daily ozone values at each monitor are use to determine compliance, independent of what happened at other monitors, or what happened the day before, the day after, or for the entire week.

The ENVIRON analysis summarized here demonstrated that the impacts of emissions from the cement plants on individual monitors is significant, and also that 90% NOx reductions can have substantial benefits to monitors in Tarrant County that are among the most stubborn to bring into compliance with the ozone standard.

5.4.5 Summary of Recent Developments Regarding Cement Kilns

It is regrettable that the State overroad the most recent information available and chose to move forward with a 36% reduction strategy for the Ellis County cement kilns. A 90% reduction strategy would have for the first time substantially lowered the tpd NOx reductions from the kilns compared to their historical NOx emissions levels. There are numerous flaws in the State's arguments in the Submitted SIP regarding the technological feasibility and cost effectiveness of advanced NOx controls for the kilns. The most recent studies, assessments, and control technology installations prove that 90% reductions are technologically and economically achievable, and that controls at these levels on the kilns would result in major reductions in ozone levels throughout Tarrant, Parker, Wise, and Denton Counties, and at numerous compliance monitors in the area. The reports and assessments that support these conclusions include:

- ENVIRON, "Dallas/Fort Worth 2009 Midlothian Cement Kiln Sensitivity Tests," February 22, 2006.

- ERG Inc., "Assessment of NOx Emission Reduction Strategies for Cement Kilns - Ellis County," July 14, 2006.

- CEMEX, "Report in Support of an Application for a PSD Construction Permit Review - Kiln 3 Project, Hernando County, Florida," October 12, 2006.

- Linero A., Leibacher U., Bellin C., "High Dust SCR Succeeds at Cementeria di Monselice", Air and Waste Management Association Annual Conference and Exhibition, June 26, 2007.

This report proposes that the SIP require 90% NOx reductions from the cement kilns in Ellis County. This would provide approximately 10.5 tpd of additional NOx reductions in the DFW area.

5.5 Conclusions - Reasonably Available Control Measures

Together with ongoing federal and state programs, the Submitted SIP will implement programs to reduce NOx emissions in DFW and in east Texas from 2006 through 2009. The amounts of reduction are 60 tpd for DFW and 25 tpd from east Texas.

The photochemical modeling and the weight of evidence clearly demonstrate that these reductions and the other reductions ongoing from state and federal programs are substantially inadequate to lower ozone levels in DFW to the 84 ppb attainment level.

The State has failed to provide for the implementation of all reasonably available control measures, including the 4 measures proposed in this report. The additional control measures proposed in this report should be the minimum required for any future SIP to get EPA approval. These emission reductions are summarized in Table 5c.

Table 5c. Additional Emissions Reductions

Strategy	DFW NOx Reductions (tpd)	DFW VOC Reductions (tpd)	East/Central Texas NOx Reductions (tpd)	East/Central Texas VOC Reductions (tpd)
On-Road Mobile Sources -- DFW speed limit reduction	17.24	2.92	NA	NA
Electric Generating Units -- additional NOx controls on east and central TX EGUs	NA	NA	140	NA
Gas Compressor Engines -- 90% reduction / electrification program	14	2	135	20
Cement Kilns -- 90% reduction program	10.5	NA*	NA	NA
TOTALS	**42**	**5**	**275**	**20**

* Linero et al 2007 indicate that cement kiln SCR units are showing up to 75% simultaneous VOC removal in addition to removing NOx, but those potential reductions are not accounted for here.

Adding the proposed emission reductions to the ones in the Submitted SIP would almost double the NOx reductions in the DFW area, from approximately 60 tpd to over 100 tpd. In addition, the proposed emissions reductions would increase NOx reductions in east and central Texas from 25 tpd to 300 tpd. As added benefits, the proposed programs would reduce VOC emissions by at least 5 tpd in DFW and 20 tpd in east and central Texas.

The State may dispute that the 4 measures proposed in this report fall under the "Reasonably Available Control Measures" and "Reasonably Available Control Technology" provisions of the Clean Air Act. It is important to remember that speed limit reductions, EGU NOx controls, gas compressor electrification, and SCR units for cement kilns are not new ideas and they have been implemented in one form or another in Region VI or other locations. In addition, the Clean Air Act provides very clear guidance for the selection of emissions reduction measures in nonattainment area SIPs (42 USC 7502, Section 172, (c) (1)):

> "(c) Nonattainment Plan Provisions.- The plan provisions (including plan items) required to be submitted under this part shall comply with each of the following: (1) In general.- Such plan provisions shall provide for the implementation of **all** reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, **at a minimum**, of reasonably available control technology) and shall provide for attainment of the national primary ambient air quality standards."

RACT standards are "minimum" requirements for nonattainment SIPs, not ceilings which restrict the adoption of stringent control measures. RACT standards are the floor for emission reduction programs, whereas the ceiling is proving for "attainment with the national primary ambient air quality standards", a much higher standard. EPA should not be afraid of following the mandates of the Clean Air Act and requiring the State of Texas to adopt control measures substantially greater than the minimal ones in the SIP under review.

6.0 RECOMMENDATIONS FOR EPA REVIEW OF DFW SIP

EPA can only approve the Dallas-Fort Worth 8-Hour Ozone SIP if it believes that the photochemical modeling and the weight of evidence demonstrate that the area will be in compliance with the 84 ppb ozone standard on the attainment date.

Analysis of the photochemical modeling shows that:

- Four (4) monitors in the DFW area were predicted by the modeling to be above the 85 ppb standard. These monitors represent Dallas, Tarrant, Denton, and Collin Counties.
- Two (2) of these locations were predicted to be above the "wide margin" failure level of 88 ppb
- EPA guidance is clear that the higher the modeled margin of failure, the stronger the weight of evidence has to be to overrule the photochemical modeling results.
- EPA guidance states that if the photochemical modeling shows even 1 site (let alone 2) above the 88 ppb "wide margin" failure level, then it is unlikely that a weight of evidence determination can be convincing to conclude that the ozone standard will be attained.
- The photochemical modeling is on weak technical grounds since it relied on modeling of a single ozone episode from 1999.
- With the weakness inherent in a photochemical modeling demonstration, EPA should only have considered approving the SIP if both the photochemical modeling showed all monitors below the 85 ppb standard and the weight of evidence was convincing that attainment by 2009 was likely. Neither of those two conditions have been satisfied.

Analysis of the weight of evidence shows that:

- Ozone design values in DFW must drop from 96 ppb in 2006 to 84 ppb by the end of the 2009 ozone season.
- In order to attain the 84 ppb standard, ozone levels must drop more than 10 times faster than long-term trend data from the State shows is actually occurring.
- Long-term data from the Denton and Eagle Mountain Lake monitors show that those locations will have great difficulty reaching attainment by the end of 2009.
- Short-term (last 4 years) data show that linear trends in ozone levels across the DFW area are increasing on average.
- These short-term trends show that the rate of increase in Tarrant, Denton, and Parker Counties is greater than 1.1 ppb/year. Denton and Tarrant Counties have been the locations of all the area's highest ozone design values since 2000.
- Emissions reduction programs from 1998-2003 that were larger than the emissions reductions in the Submitted SIP failed to produce any reduction in ozone design values.

With all this evidence, it is obvious that the SIP submitted by the State of Texas fails to meet the requirements of the federal Clean Air Act. It is clear that unless addition emissions reductions are made, the DFW area will continue to violate the ozone standard on the attainment date. In accordance with Section 110 of the Clean Air Act, EPA should publish a formal finding of disapproval because the SIP is substantially inadequate to attain the 8-hour ozone standard, and require the State of Texas to submit a revised SIP with substantially greater emission reductions. Simultaneously with the disapproval and finding of substantial inadequacy, EPA should publish notification that 18-months from the date of disapproval it intends to pursue sanctions authorized by Section 179 of Clean Air Act unless an approvable SIP is submitted.

After making the formal finding of inadequacy, EPA should provide the State with minimal requirements for a revised SIP, including clear benchmarks for the photochemical modeling, the weight of evidence, and the addition of reasonably available control measures. Two options to consider when constructing these requirements are:

Option A assumes that the State continues to rely on a single ozone episode as the basis for the photochemical modeling. Under these circumstances, the minimal requirements for approval should be:

1. The application of additional reasonably available control measures to include (at a minimum) the four emission reduction strategies proposed in this report.
2. Sufficient emissions reductions for the photochemical modeling to predict all monitors in DFW meeting the standard by the attainment date, including the monitors in Denton and Tarrant Counties.
3. A thorough weight of evidence analysis that evaluates long-term ozone trends, short-term ozone trends, and the effect of previous NOx reduction strategies on ozone levels. The weight of evidence should support the conclusions of the photochemical modeling that show all monitors in attainment.

Option B assumes that the State adopts the relevant EPA guidance and expands the photochemical modeling with additional ozone episodes. Under these circumstances, the minimal requirements for approval should be:

1. The application of additional reasonably available control measures to include (at a minimum) the four strategies proposed in this report.
2. Sufficient emissions reductions so that the combination of the weight of evidence and the photochemical modeling give assurance that the area will be in attainment. The weight of evidence analysis should include a thorough evaluation of long-term ozone trends, short-term ozone trends, and the effect on ozone of previous NOx reduction strategies, in light of proposed reduction strategies.

If the State is unwilling or unable to produce a SIP that satisfies either of the minimum requirements specified by these two options, EPA should publish its intent to promulgate a Federal Implementation Plan (FIP) per the requirements of the Clean Air Act, Section 110. The FIP should be based on robust photochemical modeling that meets the minimum

requirements for episode selection in the October 2005 Guidance Document. In addition, the FIP should implement all the control measures in the State's June 2007 Submitted SIP, adopt the additional emission reduction measures proposed in this report, and require any/all other emission reduction measures needed to bring the DFW non-attainment area into compliance with the ozone standard.

6.1 FINAL NOTE

The ozone problem in Dallas-Forth Worth is not insoluble. If we slow down a little on the highways, take more care in how we make cement and electricity, and change the way we push natural gas around in our pipeline systems, we can make major improvements in air quality and enhance the health of the public.

7.0 REFERENCES

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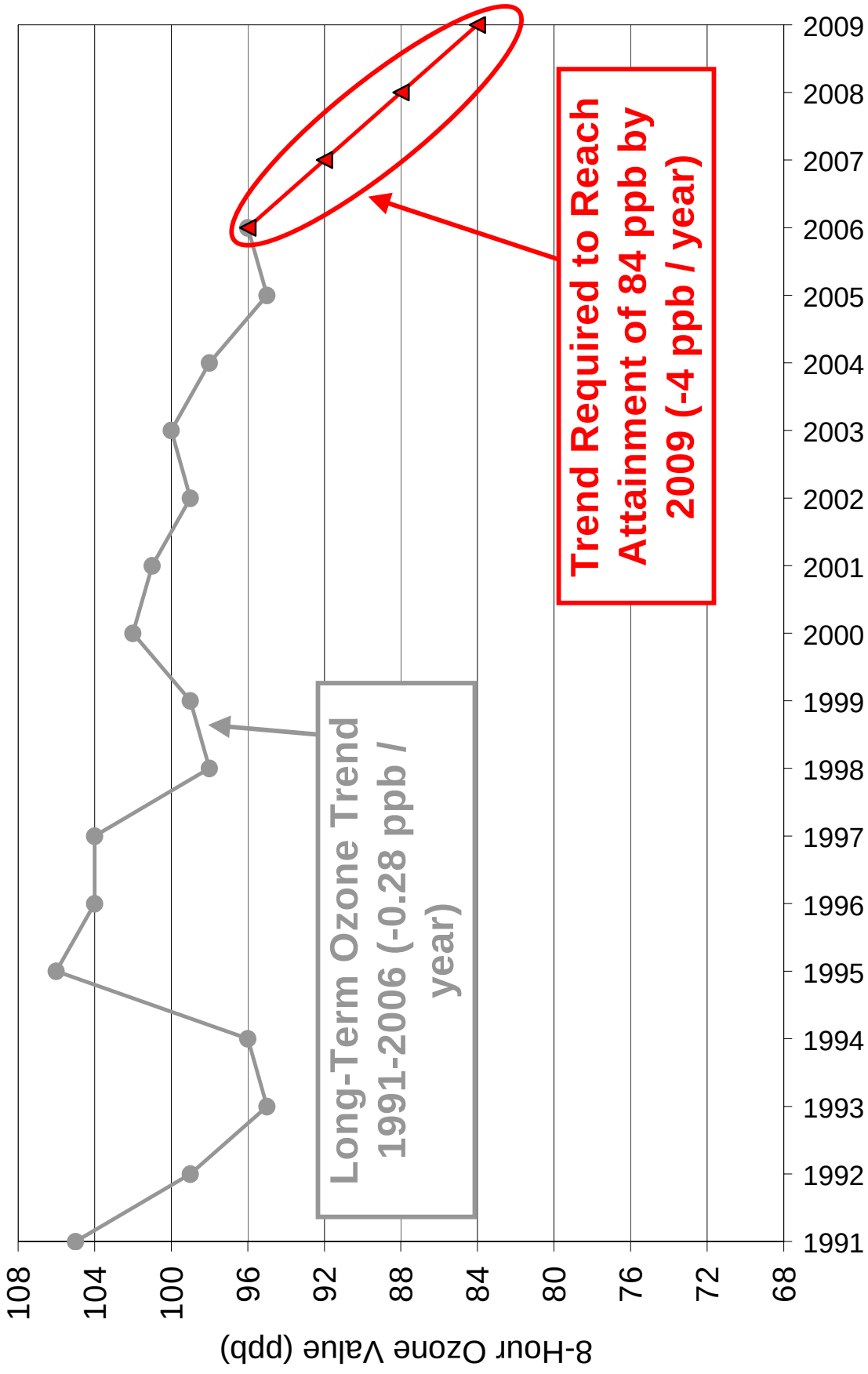
Trend Required to Reach Attainment of 84 ppb by 2009 (-4 ppb / year)
Long-Term Ozone Trend 1991-2006 (-0.28 ppb / year)
8-Hour Ozone Value (ppb)
108
104
100
96
92
88
84
80
76
72
68
2009
2008
2007
2006
2005
2004
2003
2002
2001
2000
1999
1998
1997
1996
1995
1994
1993
1992
1991

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HOUSE OF REPRESENTATIVES

OFFICIAL MEMORANDUM
STATE OF TEXAS
OFFICE OF THE GOVERNOR

MESSAGE

TO THE SENATE AND HOUSE OF REPRESENTATIVES OF THE SEVENTY-EIGHTH TEXAS LEGISLATURE, FIRST CALLED SESSION:

WHEREAS, the people of Texas through their state Constitution have placed the power to call the legislature into special session in the hands of the Chief Executive Officer of the State; and

WHEREAS, the members of the Seventy-Eighth Texas Legislature, First Called Session, have now convened to consider items presented to them by the Governor;

NOW, THEREFORE, I, RICK PERRY, Governor of the State of Texas, by the authority vested in me by Article IV, Section 8 and Article III, Section 40 of the Texas Constitution, do hereby present the following matter to the Seventy-Eighth Texas Legislature, First Called Session for consideration:

Legislation permitting the Legislative Budget Board to meet by teleconference.

IN TESTIMONY WHEREOF, I have signed my name officially and caused the Seal of the State to be affixed hereto at Austin, this 1st day of July, 2003.

Rick Perry

RICK PERRY
Governor of Texas

ATTESTED BY:

Gwyn Shea

GWYN SHEA
Secretary of State

The author's two sons, Ferris and Simon, at the Wichita Mountains National Wildlife Refuge in Oklahoma, Summer 2007.