

**OZONE IMPACTS IN  
NORTHEAST TEXAS OF  
PROPOSED NEW POWER PLANTS**

Prepared for

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## **1. INTRODUCTION**

### **BACKGROUND**

On December 20, 2002 local governments in a five county area of Northeast Texas (Gregg, Harrison, Rusk, Smith, and Upshur counties) entered into an Early Action Compact (EAC) with the U.S. Environmental Protection Agency (EPA) and the Texas Commission on Environmental Quality (TCEQ). The purpose of the EAC is to develop and implement a Clean Air Action Plan (CAAP) that will reduce ground level ozone concentrations throughout the five county area to comply with the 8-hour ozone standard by December 31, 2007 and maintain the standard beyond that date. The CAAP was submitted to the EPA in March, 2004. EPA designated all five counties as 8-hour ozone attainment areas on April 15, 2004 (see 69 FR 23858).

Ozone air-quality planning activities for Northeast Texas are directed by a local, multi-stakeholder group called Northeast Texas Air Care (NETAC). NETAC conducts technical studies such as ambient monitoring, emission inventory development, air quality modeling and demonstrating emission reduction technologies. NETAC's research studies are designed to improve the understanding of the causes of high ozone in Northeast Texas and thereby promote the most effective, and cost effective air quality management solutions.

### **OBJECTIVES**

Current proposals to build 17 new electric generating units (EGUs) in Eastern Texas could potentially increase ozone concentrations in Northeast Texas. Ten of the 17 proposed EGUs are from Texas Utilities (TXU). In order to compensate for their emission increases, TXU has proposed an offset strategy that would reduce emissions or shut down some of their existing EGUs.

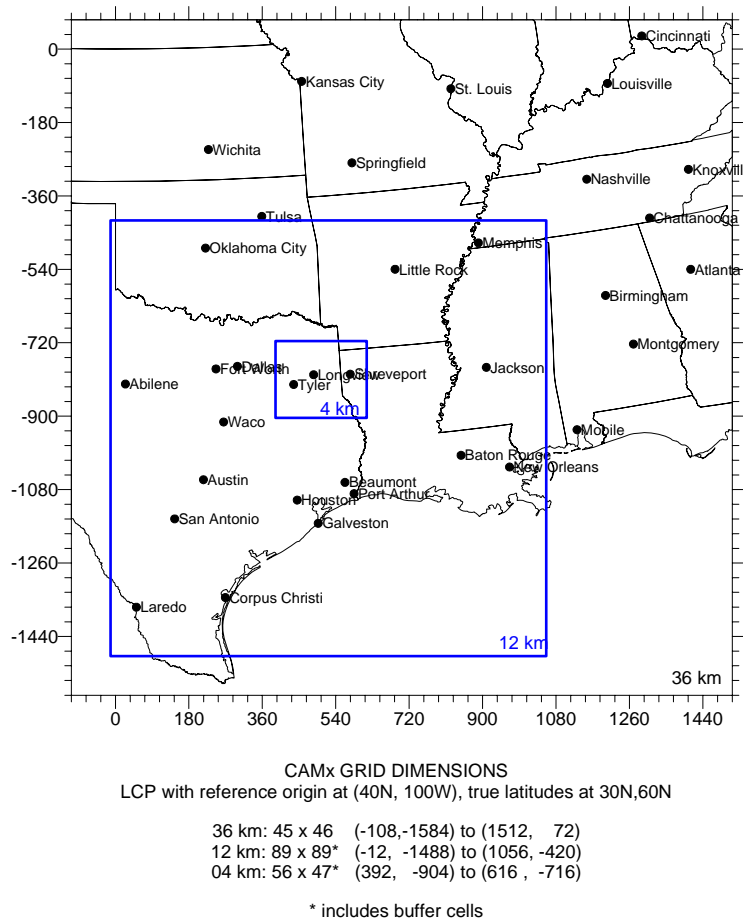
The ozone impacts from proposed new EGU in Texas were first analyzed using four Dallas/Fort Worth episodes in 1999 and 2002 in a 2009 future year (Yarwood et al., 2006). This report focuses on the 8-hour ozone impacts to Northeast Texas by using the August 13-22, 1999 episode with a 2007 future year as had been used in the Northeast Texas EAC (NETAC, 2004). This does not mean that either the new EGUs or proposed could be completed by 2007, rather 2007 is the future year available for this analysis. Details of the modeling inputs are described in Section 2. Impacts from the proposed EGUs and offsets to Northeast Texas are detailed in Section 3, and summarized in Section 4.

## 2. MODEL CONFIGURATION

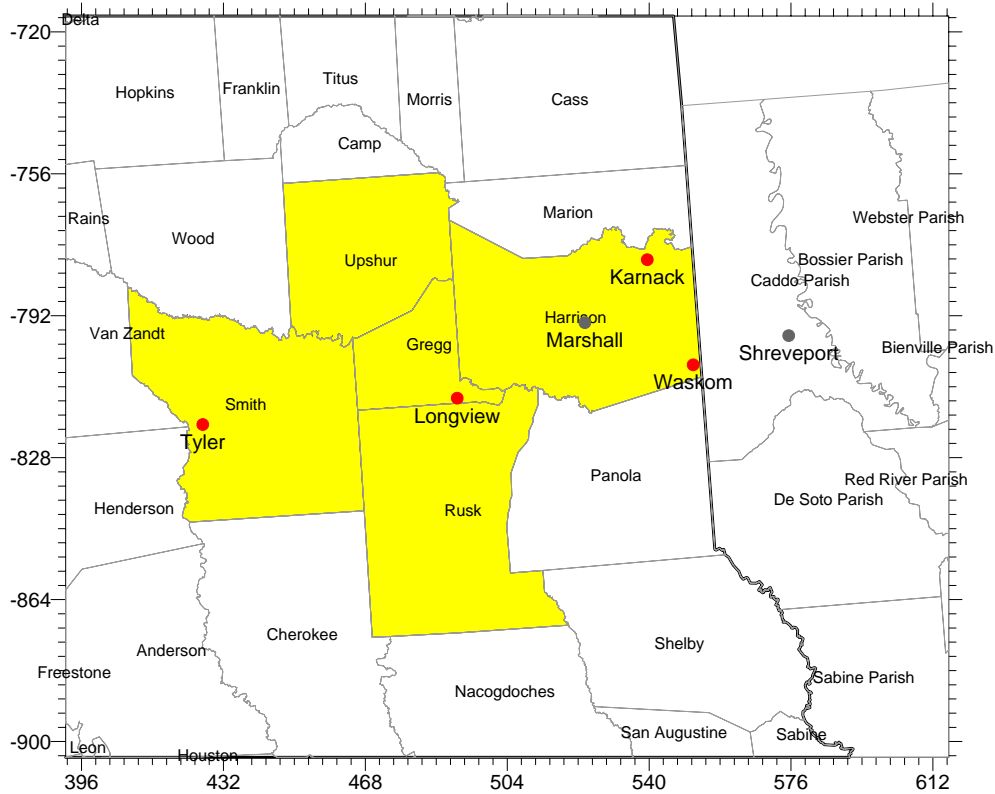
Using existing model inputs developed for the Northeast Texas EAC (NETAC, 2004), CAMx version 4.03 was used to evaluate the impacts of the proposed new EGUs and offsets to 8-hour ozone in Northeast Texas during the August 13-22, 1999 episode for a 2007 future year.

### MODEL INPUTS

A plot of the 36 km domain with 12 km and 4 km nested grids is shown in Figure 2-1; the Northeast Texas 4 km domain is shown in greater detail in Figure 2-2. The five counties in yellow (Gregg, Harrison, Rusk, Smith, and Upshur) comprise the Northeast Texas near non-attainment area. Within this area, four ozone monitors (Tyler, Longview, Waskom, and Karnack indicated by the red dots in Figure 2-2) were used in ozone design value calculations for the 2007 future year.



**Figure 2-1.** CAMx 36 km modeling domain showing nested 12-km and 4-km fine grids.



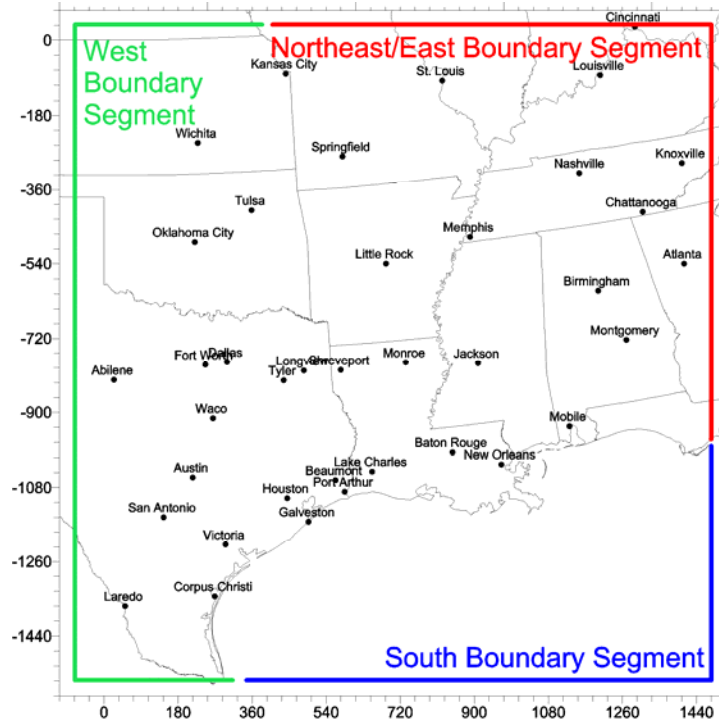
**Figure 2-2.** CAMx 4 km nested grid with the locations of ozone monitors.

The CAMx model used 15 vertical layers up to 4000 m above ground level, including 10 layers within the planetary boundary layer. Meteorological fields were developed using the MM5 meteorological model (version 3.4). Boundary conditions were assigned for three boundary segments up to 1700 m above ground level, as shown in Figure 2-3 and Table 2-1. Ozone and NOx were the same in all areas at 40 ppb and 1.1 ppb, respectively. VOCs were highest in the east and northeast segment to account for higher biogenic emissions, and lowest over the Gulf of Mexico. Boundary conditions above 1700 m (and the initial conditions) were set to the lowest (southern boundary) values.

The 2007 Texas EGU emissions inventory was based on 1999 CEM data. Additional details of the 2007 base case emissions can be found in the “Clean Air Action Plan for Northeast Texas” report (NETAC, 2004).

**Table 2-1.** Boundary conditions for different boundary segments.

Species	East/Northeastern Boundary	Western Boundary	Southern Boundary
O3 (ppb)	40.0	40.0	40.0
NOx (ppb)	1.1	1.1	1.1
VOC (ppbC)	50.5	22.3	9.3



**Figure 2-3.** Boundary segments assigned different boundary conditions.

**2007 BASE CASE RESULTS**

The 2007 EAC base case was replicated to ensure identical results. Table 2-2 shows the future design value calculations at four Northeast Texas ozone monitoring sites. The daily maximum 8-hour ozone near each monitor is listed for each episode date for both the base year (top) and 2007 future year (middle). For each monitor, the ratio of the episode averaged daily maximum 8-hour ozone in the future year to the base year was scaled to the base design value to compute the future design value. Dates with ozone peaks below 70 ppb in the base year were excluded from the future design value calculation. Note that the base year used 2002 emissions and corresponded to the 2001-2003 base design values.

The future design values were below 85 ppb at all Northeast Texas monitoring sites in the 2007 base case, and therefore, in attainment of the 8-hour ozone standard. Section 3 evaluates the attainment status for the proposed new EGU and offset scenarios.

**Table 2-2.** 2007 Base Case design value calculation for Northeast Texas monitors.

<b>Base Case: et.02base3</b>												
Site	990815	990816	990817	990818	990819	990820	990821	990822	Average	#Days>70		
Longview	67.3	86.5	109.6	112.9	94.8	79.9	79.2	96.6	94.2	7		
Tyler	69.3	82.0	93.6	106.0	87.5	76.5	87.1	86.3	88.4	7		
Karnack	60.7	74.6	84.4	89.6	80.3	63.8	62.6	74.0	80.6	5		
Waskom	76.1	83.5	95.8	92.2	82.6	88.8	83.2	94.0	87.0	8		
<b>Future Year: et.07base5</b>												
Site	990815	990816	990817	990818	990819	990820	990821	990822	Average	RRF <sup>1</sup>	BaseDV <sup>2</sup> [ppb]	FutureDV <sup>3</sup> [ppb]
Longview	63.6	84.8	110.4	110.4	93.1	73.8	76.7	97.8	92.4	0.981	82	80.44
Tyler	66.8	77.7	88.9	102.1	83.6	71.7	82.8	83.8	84.4	0.954	81	77.27
Karnack	56.8	73.6	81.7	85.2	76.2	60.2	59.3	72.4	77.8	0.966	84	81.14
Waskom	72.0	80.6	93.0	88.5	77.8	84.1	79.7	91.7	83.4	0.958	84	80.47
<b>Daily RRFs<sup>4</sup></b>												
Site	990815	990816	990817	990818	990819	990820	990821	990822				
Longview	0.946	0.980	1.008	0.978	0.982	0.923	0.968	1.013				
Tyler	0.964	0.949	0.950	0.963	0.956	0.937	0.951	0.971				
Karnack	0.936	0.987	0.968	0.950	0.949	0.943	0.947	0.979				
Waskom	0.946	0.965	0.971	0.959	0.942	0.947	0.957	0.975				

(1) RRF = future year average / baseline average

(2) Longview and Tyler monitors have 2001-2003 DVs; Karnack and Waskom monitors have 2002-2003 DVs.

(3) Future DV = baseline DV \* RRF

(4) Daily RRFs are for information only. They are not used to calculate the future DVs.

(5) Days in red were excluded from DV calculations because the base case ozone was below 70 ppb.

### 3. EGU MODELING RESULTS

Three EGU scenarios were modeled for the August 13-22, 1999 episode for a 2007 future year to examine the impacts of the proposed new EGUs and to determine whether the 8-hour ozone standard could still be achieved in Northeast Texas. The scenarios evaluated were:

- The addition of 10 TXU-proposed EGUs.
- The addition of 10 TXU-proposed EGUs with TXU's offset strategy.
- The addition of all 17 proposed EGUs.

#### EGU EMISSIONS

All proposed EGU emission rates were provided by TCEQ and were estimated from permit applications. Emissions were calculated using the maximum heat input rate and the 30 day emission limit. Some permit applications specified only the annual emission limit in which case TCEQ estimated a 30-day limit that was higher than the annual limit.

The location and emission rates of all proposed EGUs and offsets are listed in Table 3-1. Plants with multiple EGUs (such as Oak Grove) were combined into one listing with the number of EGUs in parentheses following the plant name. The top section lists the 10 TXU-proposed new EGUs, which include new 800 MW units at Martin Lake, Monticello, and Big Brown, each emitting 6.9 tons per day (tpd) NO<sub>x</sub>. These 10 EGUs added 72 tpd NO<sub>x</sub>, mostly over Central and Northeast Texas, as depicted by the orange arrows in Figure 3-1.

The middle section of Table 3-1 lists seven other proposed EGUs, totaling 30 tpd NO<sub>x</sub>. These EGUs are located in Central and Southern Texas, and are represented by the red arrows in Figure 3-1. All 17 proposed power plants would add 103 tpd NO<sub>x</sub>.

The bottom section of Table 3-1 lists the offset strategy proposed by TXU to counteract the emission increases from the proposed new EGUs. These NO<sub>x</sub> emissions were estimated by TXU, and the NO<sub>x</sub> reductions were relative to the emission rates in the 2007 Northeast Texas EAC modeling inventory.

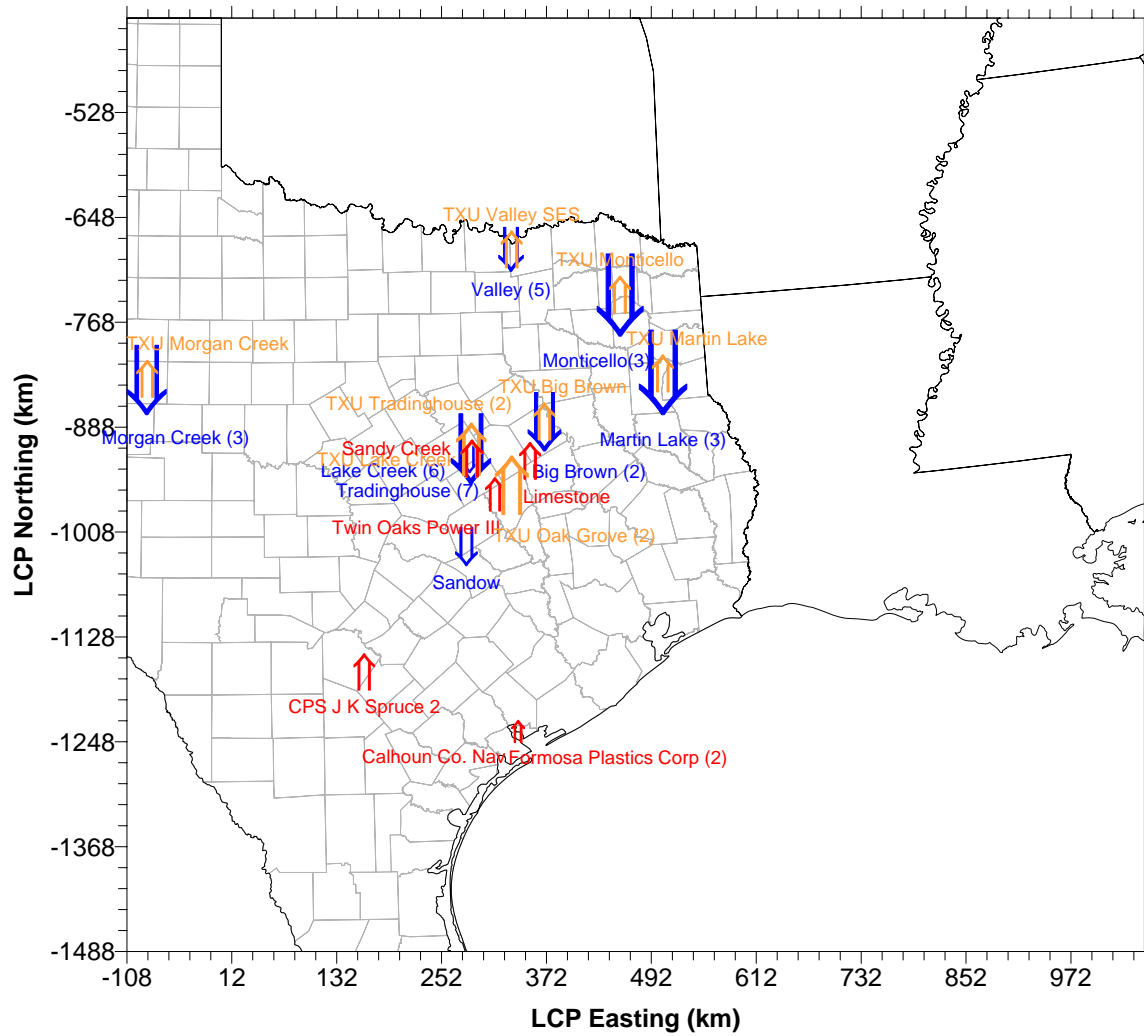
Table 3-2 shows the NO<sub>x</sub> emissions of the offset EGUs before and after the offset strategy. In the 2007 base case, the offset EGUs emitted 206 tpd NO<sub>x</sub>; emissions were reduced to 49 tpd after the offsets, yielding a 157 tpd NO<sub>x</sub> reduction. In a similar analysis performed for the Houston Advanced Research Center (HARC) project H60 (Yarwood et al., 2006) using a 2009 future year, the offset EGU NO<sub>x</sub> emissions were lowered from 122 tpd to 49 tpd. The NO<sub>x</sub> reductions were 84 tpd greater in this study than project H60 and this difference is discussed next. The Texas EGU emissions in the 2007 Northeast Texas EAC point source inventory were based on 1999 CEM data whereas the 2009 emissions for the H60 study were based on 2005 CEM data. In this study, offset strategy shutdown of TXU's gas-fired units at Tradinghouse, Valley and Lake Creek resulted in 38.1 tpd of NO<sub>x</sub> reduction (Table 3-2) whereas in H60 the corresponding reduction was 3.4 tpd; this difference is because these gas-fired plants operated much more in 1999 than 2005 (for economic reasons). Offset strategy reductions at the TXU's Martin Lake and Monticello coal-fired units were 69.8 tpd NO<sub>x</sub> in this study compared to 51.5

tpd in the H60 study: These differences result from different heat-input and emission rate assumptions and may be artificial. The emissions reductions for TXU's offset strategy should be reviewed in more detail when TXU can specify what control technology (e.g., SCR vs. SNCR) would be implemented at each offset unit.

Many of TXU's offsets were at the same location as a proposed new unit, as shown in Figure 3-1. Upward arrows represent NO<sub>x</sub> emissions from proposed new EGUs; downward arrows represent emission offsets. Figure 3-2 is identical to Figure 3-1, but zooms in over Northeast Texas. The three proposed EGUs closest to Northeast Texas (TXU's Monticello, Martin Lake, and Big Brown EGUs) each had more NO<sub>x</sub> reductions from the offset strategy than NO<sub>x</sub> increases from the proposed new units; the HARC H60 analysis also had net reductions at these locations with the offset strategy.

The emission reductions in the offset strategy reflect either (1) installing post-combustion NO<sub>x</sub> controls on coal-fired EGUs or (2) shutting down gas-fired EGUs to make space for new coal-fired EGUs. The gas-fired plants proposed to be shut down in the offset scenario, including the TXU Valley and Morgan Creek EGUs, are still permitted and could operate when needed and economic. It is unclear how to best estimate the potential future emission reduction from closing a plant such as Valley, which has been mothballed but was recently reactivated.

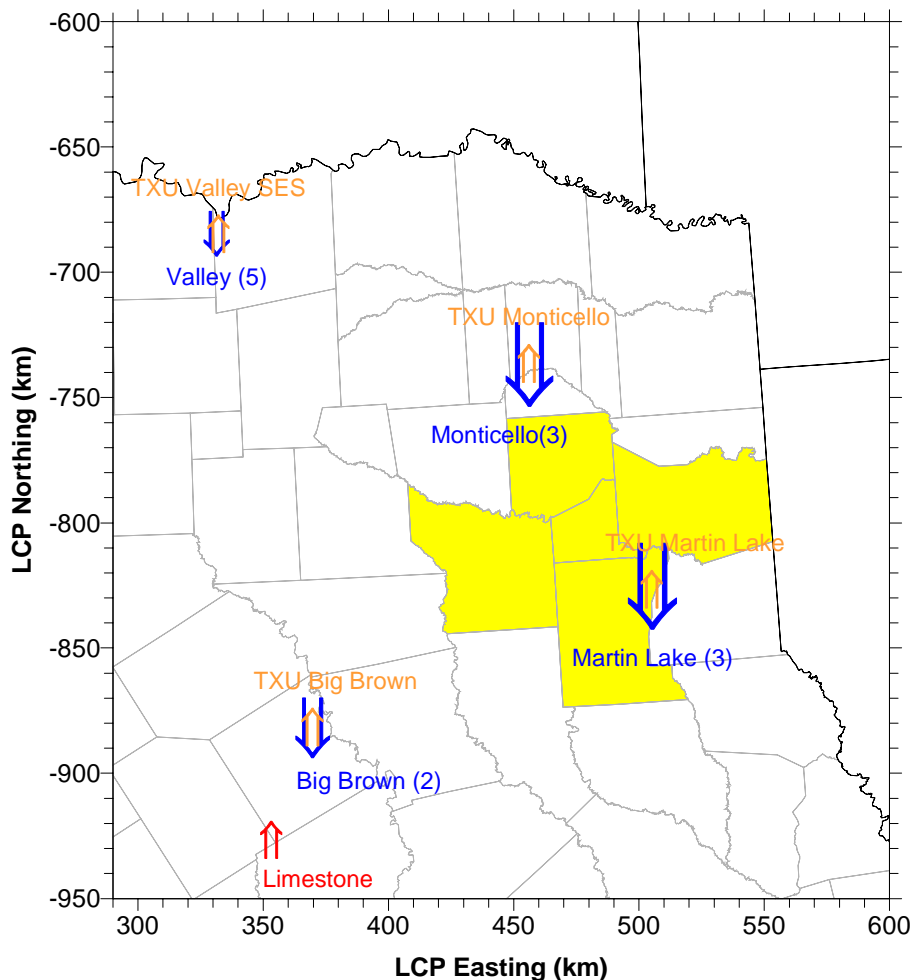
The only EGU emission offset data available to us when this study was performed were for TXU's strategy. CPS plans to reduce emissions at the J. K. Spruce EGU near San Antonio to offset emissions from a new unit (Spruce 2). CPS' strategy for Spruce 2 was not modeled because we were unaware of the strategy in sufficient time to incorporate it into our analysis. CPS' reductions at Spruce would not impact ozone levels in the NETAC area.



**Proposed EGUs and Offsets**

- ↑ = Non-TXU proposed EGUs
- ↑ = TXU proposed EGUs
- ↓ = TXU proposed offsets
- ↑↑ = 20 TPD
- ↑ = 10 TPD
- ↑ = 5 TPD

**Figure 3-1.** Changes to the 2007 NOx emissions from proposed new EGUs and offsets in Texas.



**Proposed EGUs and Offsets**

- ↑ = Non-TXU proposed EGUs
- ↑ = TXU proposed EGUs
- ↓ = TXU proposed offsets
- ↑↑ = 20 TPD
- ↑↑ = 10 TPD
- ↑ = 5 TPD

**Figure 3-2.** Changes to the 2007 NOx emissions from the proposed EGUs and offsets in Northeast Texas.

**Table 3-1.** Changes to the 2007 base case emissions from proposed EGUs and offsets.

Plant	City	County	LCPx [km]	LCPy [km]	NOx [tpd]	VOC [tpd]	CO [tpd]
<b>10 TXU-proposed EGUs</b>							
TXU Valley SES	Savoy	Fannin	332.13	-684.6	6.88	0.35	29.47
TXU Big Brown	Fairfield	Freestone	369.65	-881.51	6.88	0.35	29.47
TXU Lake Creek	Riesel	McLennan	286.06	-924.36	6.88	0.35	29.47
TXU Tradinghouse (2)	Waco	McLennan	286.02	-913.24	13.75	0.7	58.94
TXU Morgan Creek	Colorado City	Mitchell	-84.73	-832.61	6.88	0.35	29.47
TXU Martin Lake	Tatum	Rusk	505.1	-826.52	6.88	0.35	29.47
TXU Monticello	Mt Pleasant	Titus	456.07	-736.39	6.88	0.35	29.47
TXU Oak Grove (2)	Franklin	Robertson	332.23	-954.47	17.22	1.13	73.2
<b>Total</b>					<b>72.23</b>	<b>3.91</b>	<b>308.98</b>
<b>7 non-TXU proposed EGUs</b>							
Twin Oaks Power III	Bremond	Robertson	313.04	-964.88	5.58	0.36	11.95
CPS J K Spruce 2	San Antonio	Bexar	163.45	-1168.08	6.62	0.35	53.76
Sandy Creek	Riesel	McLennan	286.89	-923.87	6.88	0.35	29.47
Formosa Plastics Corp (2)	Point Comfort	Calhoun	339.68	-1236.29	2.52	0.19	3.96
Calhoun Co. Nav. Dist.	Point Comfort	Calhoun	339.1	-1236.22	2.23	0.16	4.78
NRG Limestone	Jewett	Limestone	353.23	-926.53	6.72	0.43	53.76
<b>Total</b>					<b>30.55</b>	<b>1.84</b>	<b>157.68</b>
<b>Total from all 17 EGUs</b>					<b>102.78</b>	<b>5.75</b>	<b>466.66</b>
<b>TXU offsets<sup>1</sup></b>							
TXU Valley (5)	Savoy	Fannin	331.45	-684.57	-9.7	-0.03	-2.40
TXU Big Brown(2)	Fairfield	Freestone	369.71	-881.84	-17.2	0.00	0.00
TXU Lake Creek (6)	Riesel	McLennan	284.01	-924.87	-3.6	-0.01	-0.60
TXU Tradinghouse (7)	Waco	McLennan	285.61	-912.84	-24.8	-0.05	-3.72
TXU Morgan Creek (3)	Colorado City	Mitchell	-85.33	-834.00	-24.1	-0.02	-1.47
TXU Martin Lake(3)	Tatum	Rusk	505.38	-825.34	-36.0	0.00	0.00
TXU Monticello(3)	Mt Pleasant	Titus	456.31	-736.85	-33.8	0.00	0.00
TXU Sandow	Rockdale	Milam	280.40	-1024.54	-7.4	0.00	0.00
<b>Total from offsets</b>					<b>-156.67</b>	<b>-0.11</b>	<b>-8.19</b>
<b>Total from all 17 EGUs + offsets</b>					<b>-53.89</b>	<b>5.64</b>	<b>458.47</b>

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**Table 3-2.** 2007 NOx (top), VOC (center), and CO (bottom) emissions of EGUs used in the offset strategy before and after the offsets.

Plant	Location	County	LCPx[km]	LCPy[km]	2007 base NOx [tpd]	NOx with offsets[tpd]	NOx change
Valley (5)	SAVOY	FANNIN	331.45	-684.57	9.7	0.0	-9.7
Big Brown (2)	FAIRFIELD	FREESTONE	369.71	-881.84	24.6	7.4	-17.2
Lake Creek (6)	WACO	MCLENNAN	284.01	-924.87	3.6	0.0	-3.6
Tradinghouse (7)	WACO	MCLENNAN	285.61	-912.84	24.8	0.0	-24.8
Morgan Creek (3)	COLORADO CITY	MITCHELL	-85.33	-834.00	24.1	0.0	-24.1
Martin Lake (3)	TATUM	RUSK	505.38	-825.34	57.5	21.5	-36.0
Monticello(3)	MOUNT PLEASANT	TITUS	456.31	-736.85	48.4	14.5	-33.8
Sandow	ROCKDALE	MILAM	280.40	-1024.54	13.2	5.8	-7.4
<b>TOTAL</b>					205.8	49.2	-156.7

Plant	Location	County	LCPx[km]	LCPy[km]	2007 Base VOC [tpd]	VOC with offsets [tpd]	VOC change [tpd]
Valley	SAVOY	FANNIN	331.45	-684.57	0.03	0.00	-0.03
Big Brown	FAIRFIELD	FREESTONE	369.71	-881.84	0.60	0.60	0.00
Lake Creek	WACO	MCLENNAN	284.01	-924.87	0.01	0.00	-0.01
Tradinghouse	WACO	MCLENNAN	285.61	-912.84	0.05	0.00	-0.05
morgan creek	COLORADO CITY	MITCHELL	-85.33	-834.00	0.02	0.00	-0.02
Martin Lake	TATUM	RUSK	505.38	-825.34	0.00	0.00	0.00
Monticello	MOUNT PLEASANT	TITUS	456.31	-736.85	0.00	0.00	0.00
Sandow	ROCKDALE	MILAM	280.40	-1024.54	0.37	0.37	0.00
<b>TOTAL</b>					1.08	0.97	-0.11

Plant	Location	County	LCPx[km]	LCPy[km]	2007 Base CO [tpd]	CO with offsets [tpd]	CO change [tpd]
Valley	SAVOY	FANNIN	331.45	-684.57	2.40	0.00	-2.40
Big Brown	FAIRFIELD	FREESTONE	369.71	-881.84	2.23	2.23	0.00
Lake Creek	WACO	MCLENNAN	284.01	-924.87	0.60	0.00	-0.60
Tradinghouse	WACO	MCLENNAN	285.61	-912.84	3.72	0.00	-3.72
morgan creek	COLORADO CITY	MITCHELL	-85.33	-834.00	1.47	0.00	-1.47
Martin Lake	TATUM	RUSK	505.38	-825.34	0.00	0.00	0.00
Monticello	MOUNT PLEASANT	TITUS	456.31	-736.85	0.00	0.00	0.00
Sandow	ROCKDALE	MILAM	280.40	-1024.54	1.34	1.34	0.00
<b>TOTAL</b>					11.75	3.56	-8.19

## OZONE IMPACTS

The top left plot in Figure 3-3 shows the episode average of the daily maximum 8-hour ozone in the Northeast Texas 4 km domain for the 2007 base case. A domain peak of just under 85 ppb was found near Longview. The other three plots in Figure 3-3 show differences from the 2007 base case when adding the proposed EGUs and offsets. The top right plot displays the episode average impact when adding all 17 proposed EGUs. The bottom plots show the impacts when adding the 10 TXU-proposed EGUs without offsets (left) and with offsets (right).

When the 10 TXU-proposed EGUs were added, the episode average 8-hour ozone increased 0.5 to 1.0 ppb near the Monticello and Martin Lake EGUs. The greatest impact from the Monticello EGU was north of the Northeast Texas 5-county near non-attainment area. The largest impact from the Martin Lake EGU was in Rusk County. Impacts from the 17-proposed EGUs were similar to the 10 TXU-proposed EGUs because the seven non-TXU proposed EGUs were not near Northeast Texas.

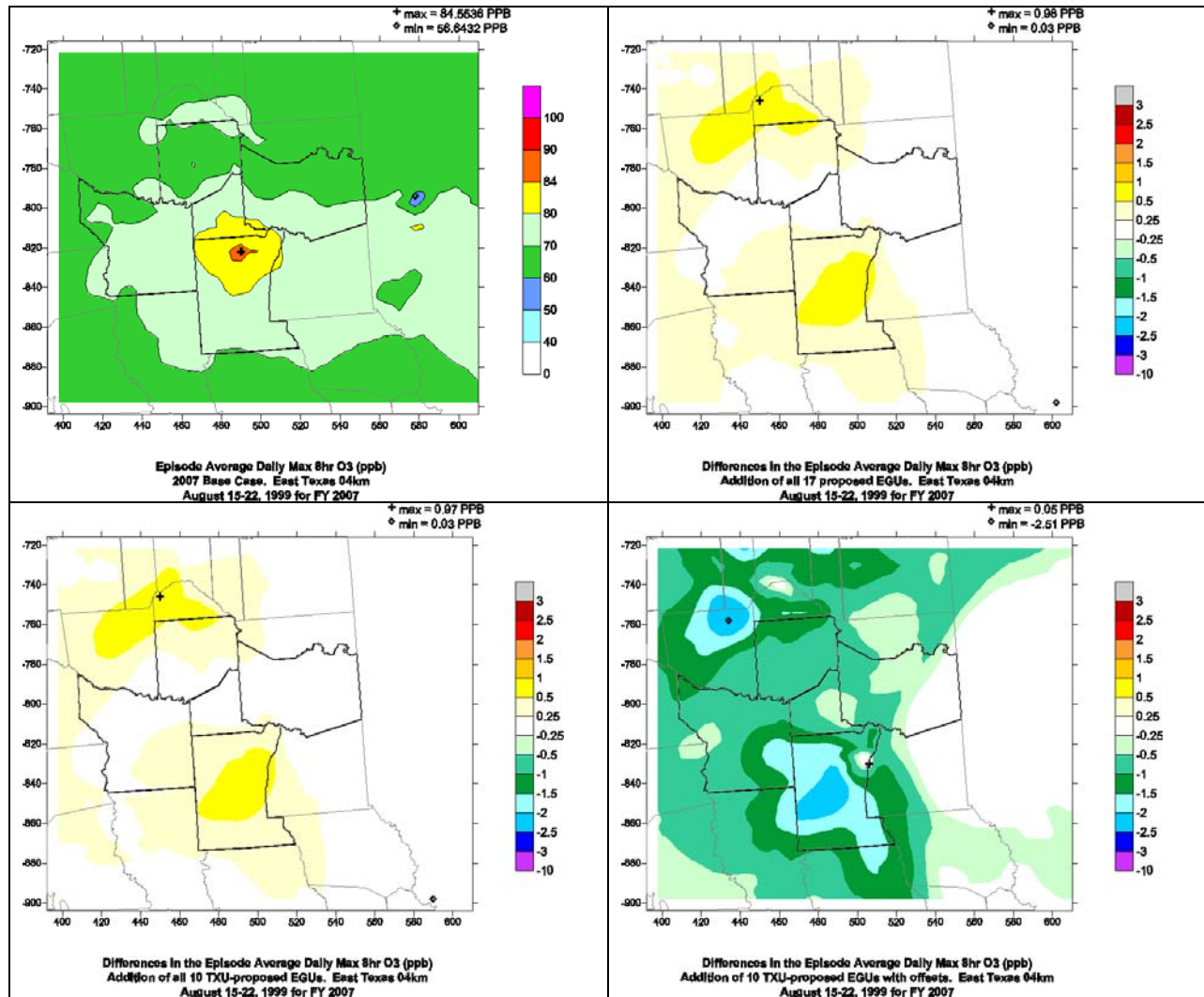
When the 10 TXU-proposed EGUs with TXU offsets were added to the 2007 base case, ozone was reduced or unchanged throughout the Northeast Texas 4 km domain. Two areas saw 8-hour ozone reductions of at least 2 ppb – central Rusk County and northeast Wood County – since more NO<sub>x</sub> was reduced from the offsets at the Martin Lake and Monticello EGUs than added from the proposed units.

Future design values were computed at each of the four ozone monitoring sites in Northeast Texas for each of the three EGU scenarios in 2007, as had been conducted for the 2007 base case in Table 2-2. A summary of the 2007 design values from each scenario is shown in Table 3-3; differences from the 2007 base case design value are also listed. The highest future design value was 81.5 ppb at Karnack when either the 10 TXU-proposed EGUs or all 17 proposed EGUs were added. Since this is below 85 ppb, Northeast Texas would still be in attainment for 8-hour ozone. The largest increase to the future design value was 0.4 ppb at Longview.

When both the 10 TXU-proposed EGUs and offsets were added, the 2007 design values dropped as much as 1.0 ppb at Longview. Waskom, which was least impacted by the proposed EGUs and offsets, was 0.1 ppb lower and had the highest future design value (80.4 ppb) in this scenario.

Figure 3-4 displays the same spatial plots as Figure 3-3, but for the daily maximum 8-hour ozone for each individual date in the episode. Plumes originating near the Monticello and Martin Lake EGUs are visible on all episode dates when adding the 10 and 17 proposed EGUs. The largest impact to 8-hour ozone in Northeast Texas was a 2.0 to 2.5 ppb increase in central Rusk County and northern Upshur County on August 17. The most widespread impact was on August 19, when a northerly wind added over 0.5 ppb to most of the Northeast Texas 5-county near non-attainment area.

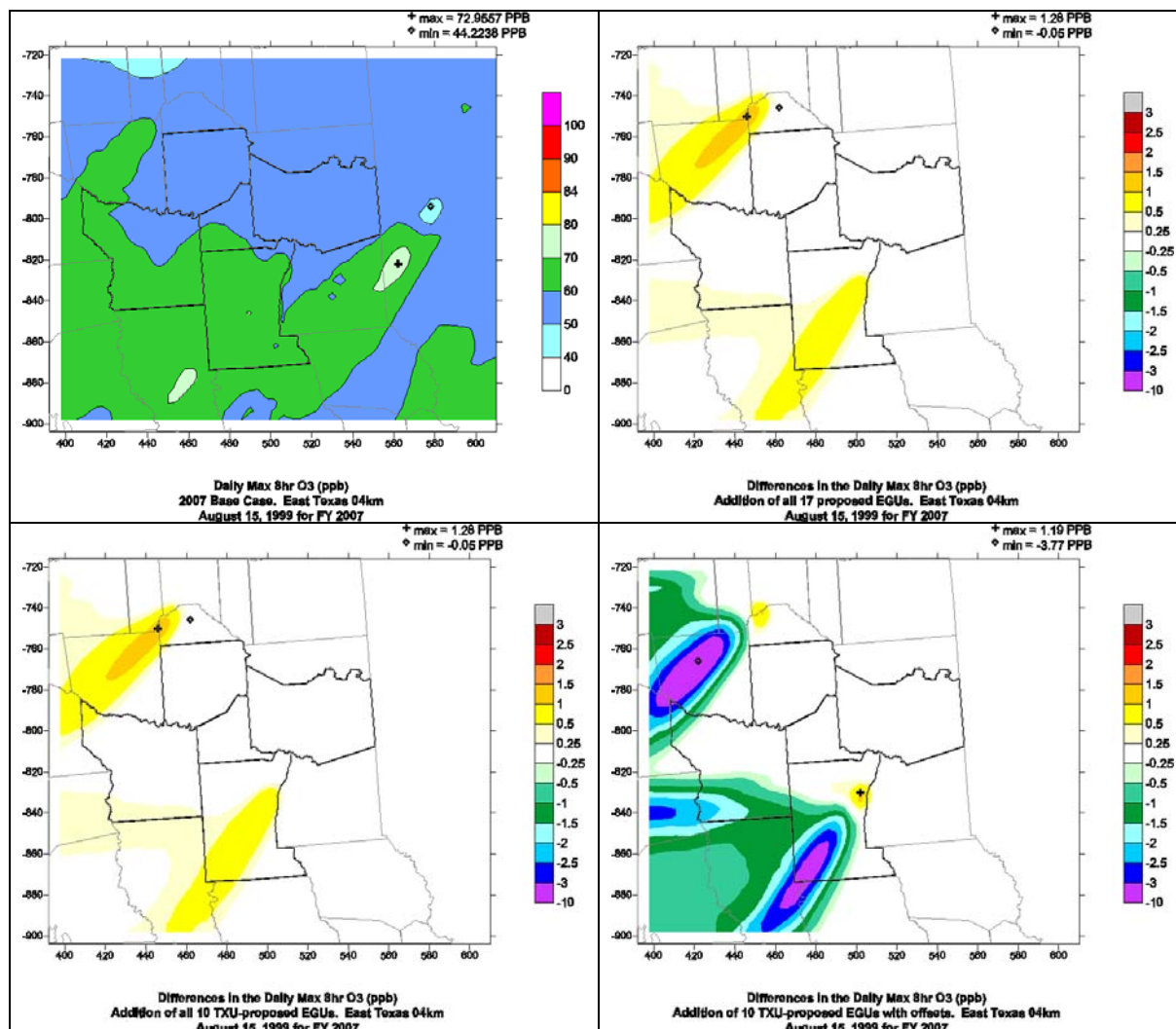
When the offsets were added to the 10 TXU-proposed EGUs, 8-hour ozone was reduced downwind of the Monticello and Martin Lake EGUs on each episode date; local increases of up to 2 ppb were found directly over the plant sites on several dates. Rusk County benefited the most from the offsets as the daily maximum 8-hour ozone was lowered by as much as 8 ppb.



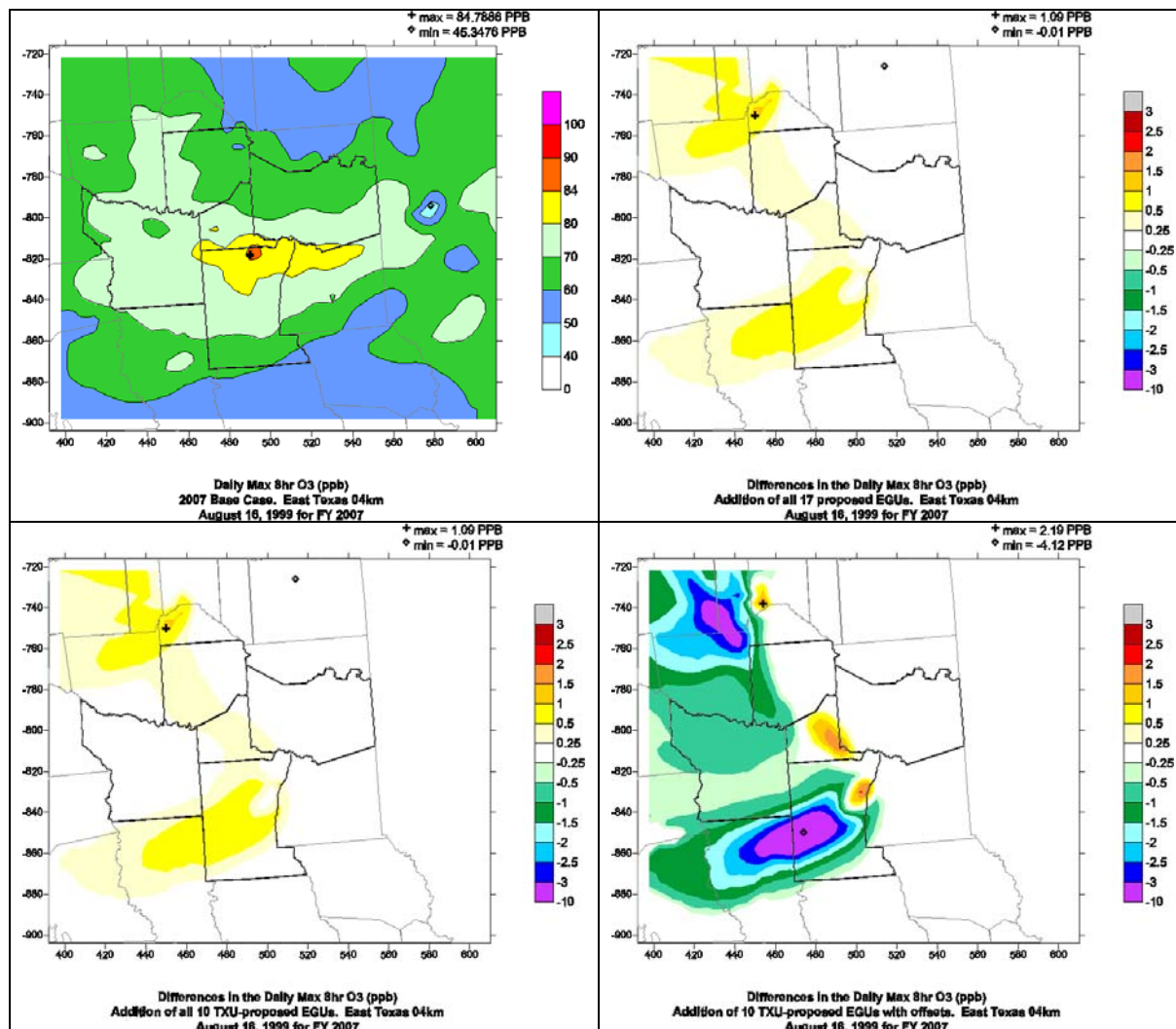
**Figure 3-3.** Episode averaged daily maximum 8-hour ozone in the 2007 base case (top left) and differences from the base case when adding 17 proposed EGUs (top right), 10 TXU-proposed EGUs (bottom left), and 10 TXU-proposed EGUs with offsets (bottom right).

**Table 3-3.** 2007 future design values for each EGU scenario (top) and differences from the base case (bottom).

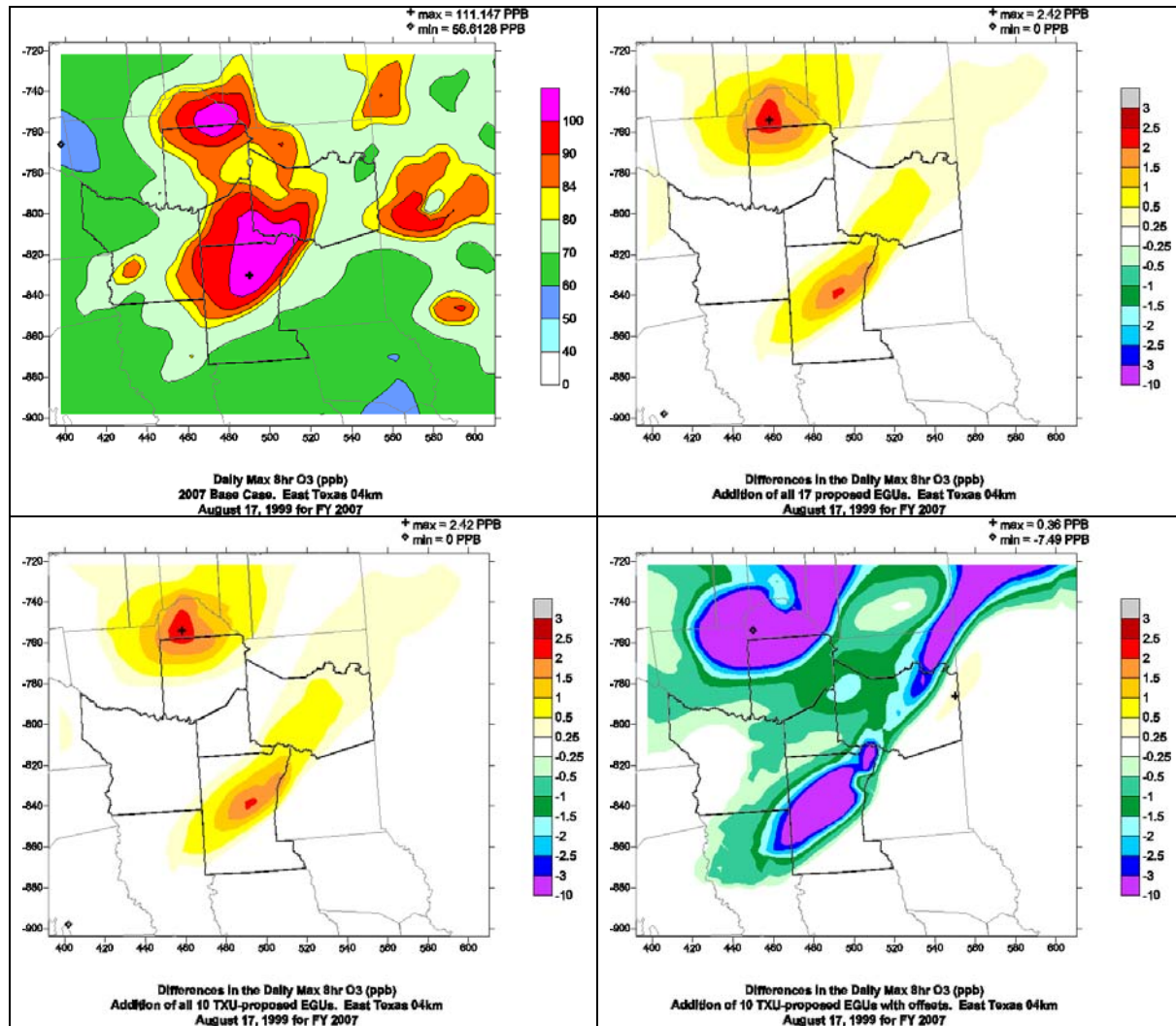
Run:	07base5	07base5. add_egu17	07base5. add_egu10_txu	07base5. add_egu10_txu-off
Scenario:	2007 base case	Add 17 proposed EGUs	Add 10 TXU-proposed EGUs	Add 10 TXU-proposed EGUs with offsets
<b>Monitor</b>	<b>2007 8-hour Ozone Design Value (ppb)</b>			
Longview	80.4	80.9	80.9	79.5
Tyler	77.3	77.5	77.5	76.6
Karnack	81.1	81.5	81.5	80.3
Waskom	80.5	80.6	80.6	80.4
	<b>Change from 2007 Base Case Design Value (ppb)</b>			
Longview		0.4	0.4	-1.0
Tyler		0.3	0.3	-0.6
Karnack		0.3	0.3	-0.8
Waskom		0.1	0.1	-0.1



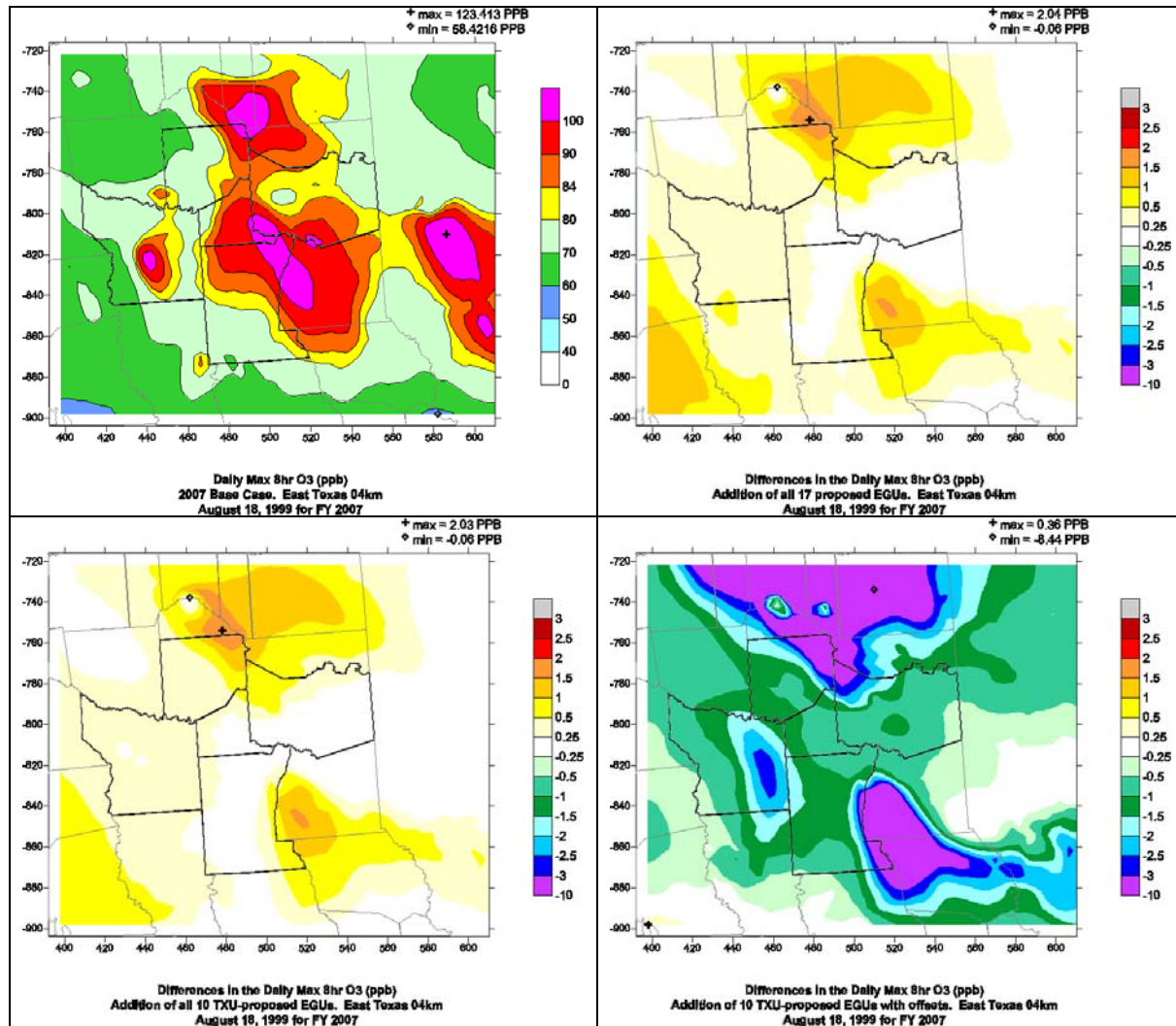
**Figure 3-4.** Daily maximum 8-hour ozone of the 2007 base case (top left) and differences from the base case when adding 17 proposed EGUs (top, right), 10 TXU-proposed EGUs (bottom, left), and 10 TXU EGUs with offsets (bottom, right).



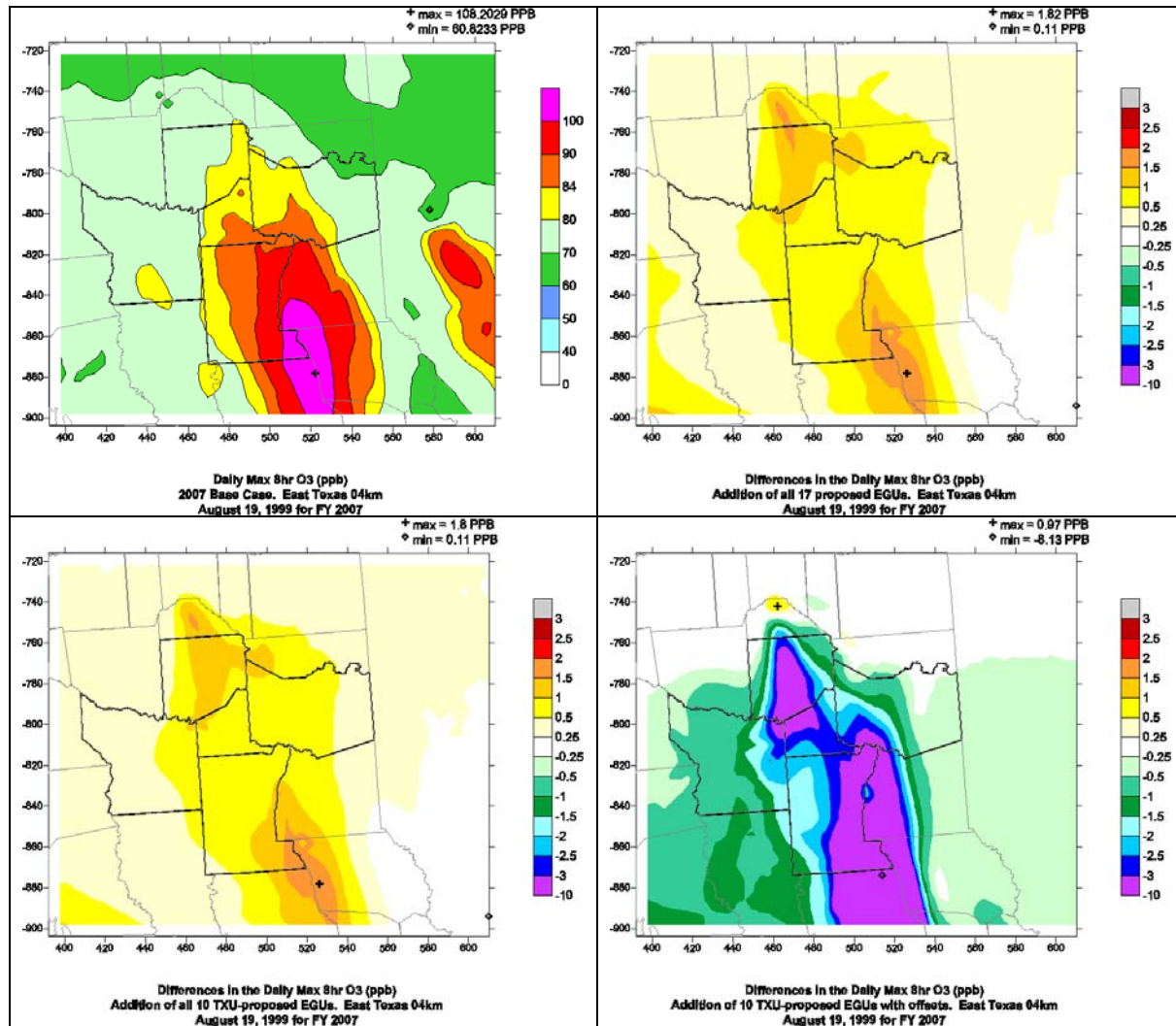
**Figure 3-4** (continued). Daily maximum 8-hour ozone of the 2007 base case (top left) and differences from the base case when adding 17 proposed EGUs (top, right), 10 TXU-proposed EGUs (bottom, left), and 10 TXU EGUs with offsets (bottom, right).



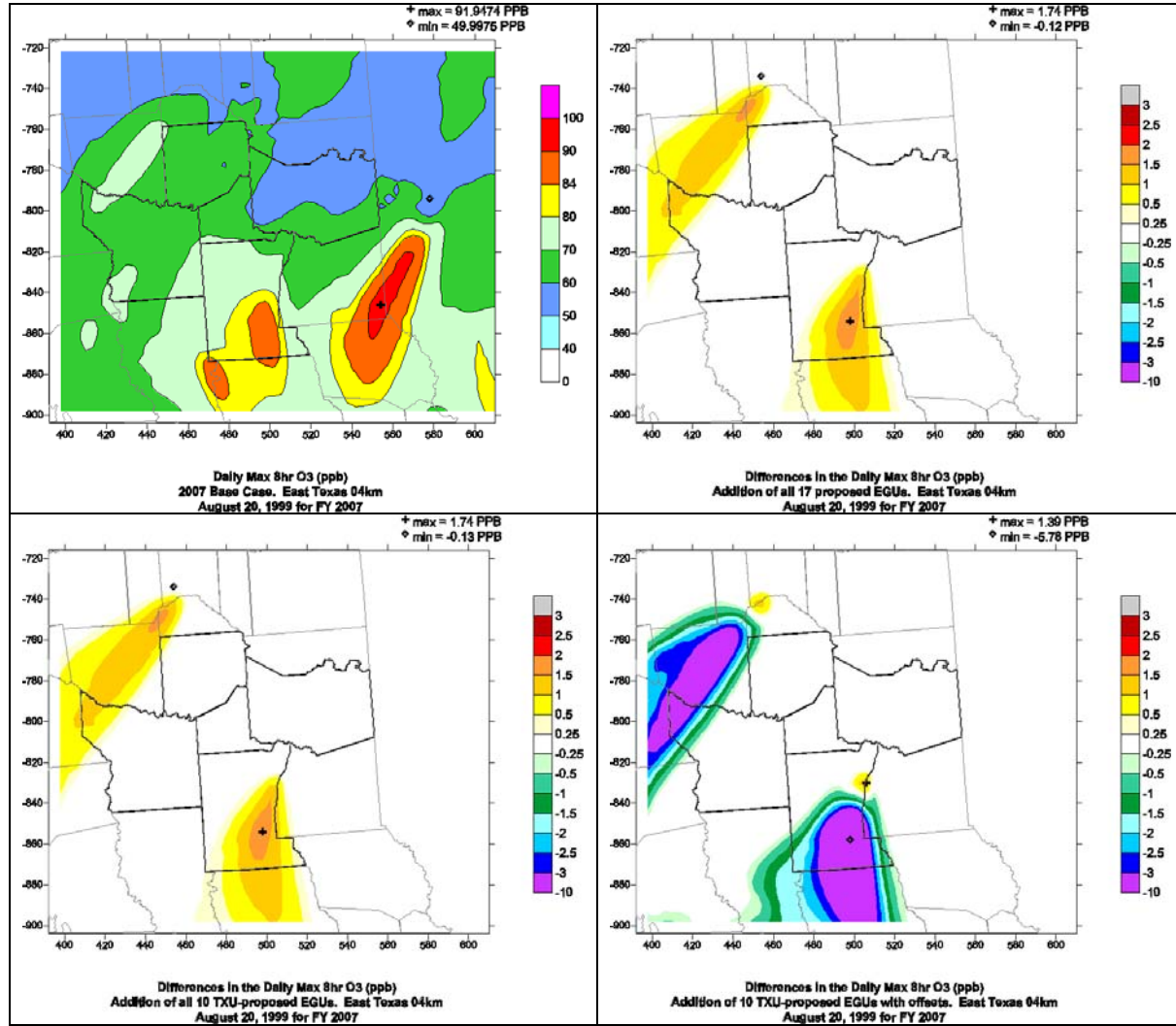
**Figure 3-4** (continued). Daily maximum 8-hour ozone of the 2007 base case (top left) and differences from the base case when adding 17 proposed EGUs (top, right), 10 TXU-proposed EGUs (bottom, left), and 10 TXU EGUs with offsets (bottom, right).



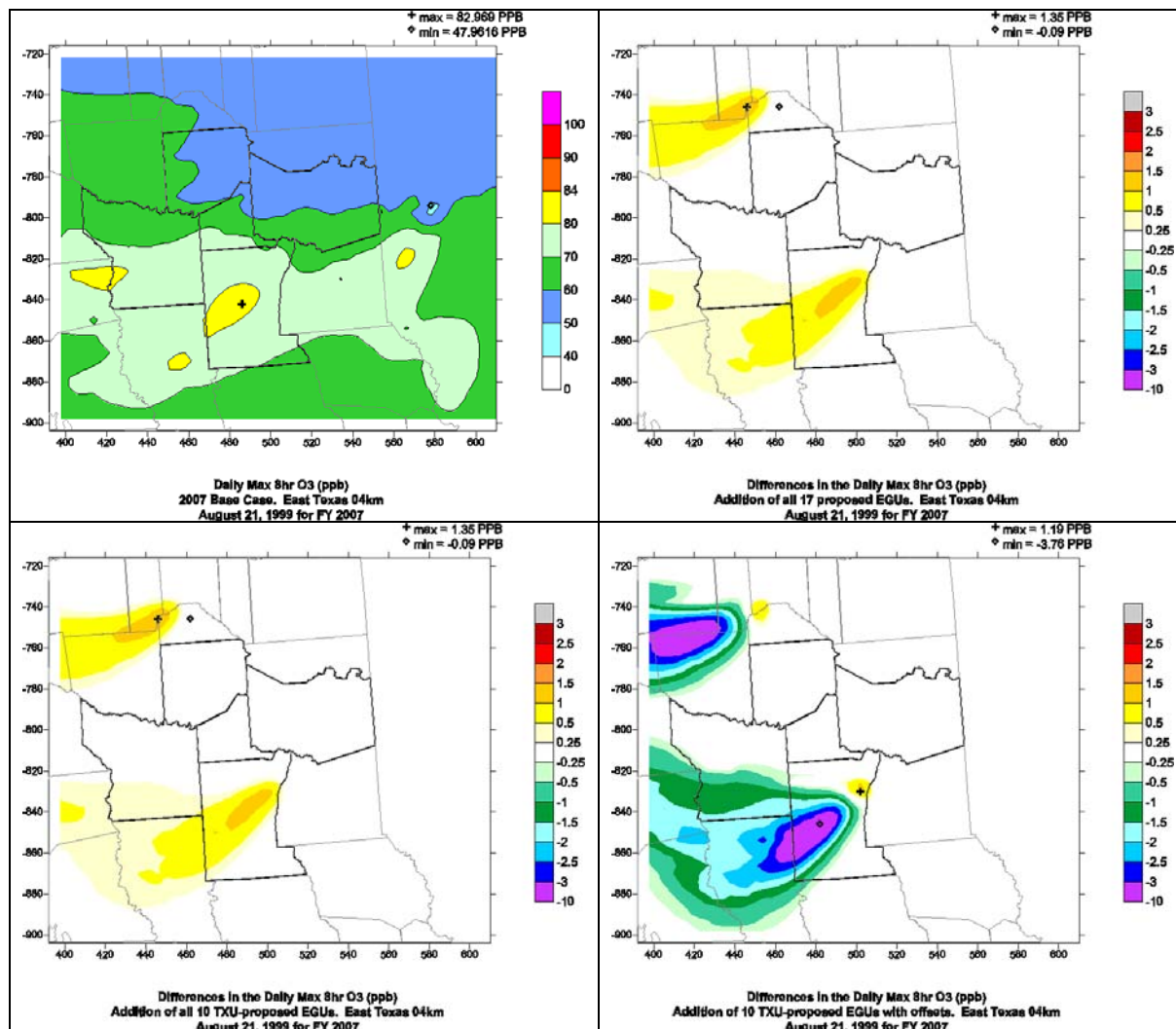
**Figure 3-4** (continued). Daily maximum 8-hour ozone of the 2007 base case (top left) and differences from the base case when adding 17 proposed EGUs (top, right), 10 TXU-proposed EGUs (bottom, left), and 10 TXU EGUs with offsets (bottom, right).



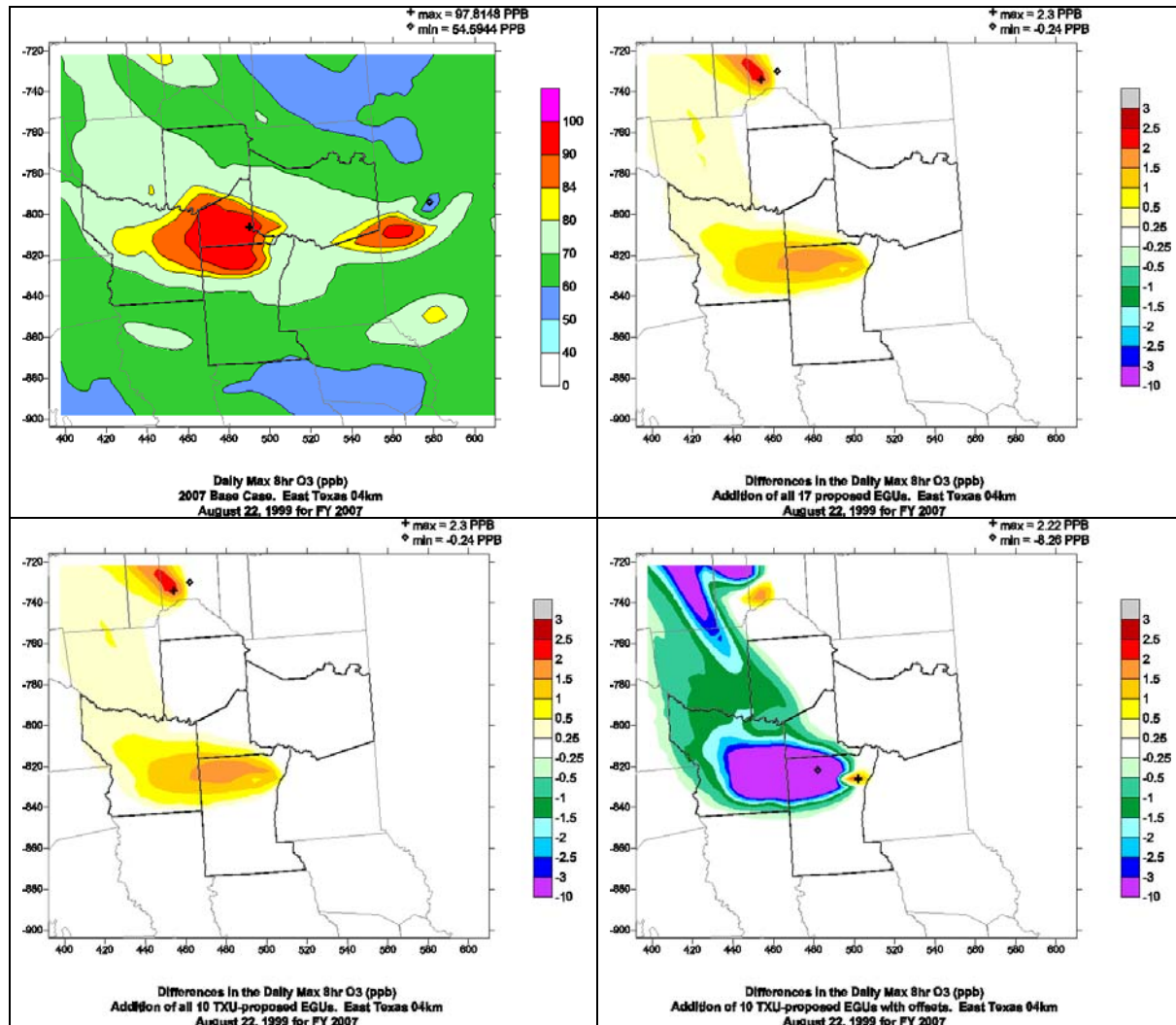
**Figure 3-4** (continued). Daily maximum 8-hour ozone of the 2007 base case (top left) and differences from the base case when adding 17 proposed EGUs (top, right), 10 TXU-proposed EGUs (bottom, left), and 10 TXU EGUs with offsets (bottom, right).



**Figure 3-4** (continued). Daily maximum 8-hour ozone of the 2007 base case (top left) and differences from the base case when adding 17 proposed EGUs (top, right), 10 TXU-proposed EGUs (bottom, left), and 10 TXU EGUs with offsets (bottom, right).



**Figure 3-4** (continued). Daily maximum 8-hour ozone of the 2007 base case (top left) and differences from the base case when adding 17 proposed EGUs (top, right), 10 TXU-proposed EGUs (bottom, left), and 10 TXU EGUs with offsets (bottom, right).



**Figure 3-4** (continued). Daily maximum 8-hour ozone of the 2007 base case (top left) and differences from the base case when adding 17 proposed EGUs (top, right), 10 TXU-proposed EGUs (bottom, left), and 10 TXU EGUs with offsets (bottom, right).

#### 4. SUMMARY

Current proposals to build 17 new electric generating units (EGUs) in Eastern Texas would add 103 tons per day (tpd) of NO<sub>x</sub> emissions, based on permit applications and maximum heat input rates with 30-day emission limits. Ten of the 17 EGUs were proposed by Texas Utilities (TXU), including new 800 MW units at the Monticello and Martin Lake plants in Northeast Texas. This report evaluates the 8-hour ozone impact from the proposed EGUs to Northeast Texas using the August 13-22, 1999 episode for 2007, as used in the Northeast Texas EAC.

In the 2007 base case from NETAC's EAC modeling, the highest 2007 future design value from the four ozone monitoring sites was 81.1 ppb, putting Northeast Texas in attainment for 8-hour ozone. The addition of the 10 TXU-proposed EGUs added up to 0.4 ppb to the 2007 future design value, mainly from new units at Monticello and Martin Lake. The highest design value of 81.5 ppb was still below 85 ppb. The addition of all 17 proposed EGUs had the same impact as the 10 TXU proposed EGUs, since the 7 non-TXU proposed EGUs were not located near Northeast Texas.

In order to compensate for emission increases, TXU proposed an offset strategy that would reduce emissions or shut down some of their existing EGUs. The offsets reduced the NO<sub>x</sub> emissions at affected units from 206 tpd in the 2007 base case to 49 tpd. The 157 tpd NO<sub>x</sub> reduction was twice as large as the offset reduction used in a similar study using a 2009 inventory based on different future year emissions data (Yarwood, et al., 2006). The emissions reductions for TXU's offset strategy should be reviewed in more detail when TXU can specify what control technology (e.g., SCR vs. SNCR) would be implemented at each offset unit. The three proposed new EGUs closest to Northeast Texas (at TXU's Monticello, Martin Lake and Big Brown plants) all had co-located offsets that were greater than the proposed NO<sub>x</sub> additions.

In the scenario with 10 TXU-proposed EGUs and TXU's offsets, 8-hour ozone was lowered in most areas of the Northeast Texas 4 km modeling domain due to the large offsets. Future design values were lower at all four monitoring sites, including a 1.0 ppb reduction at Longview. The highest future design value in this scenario was 80.4 ppb at Waskom. On a daily basis, the offset scenario reduced the daily maximum 8-hour ozone up to 8 ppb in parts of Northeast Texas.

## **REFERENCES**

Northeast Texas Air Care, 2004. "Clean Air Action Plan for Northeast Texas." Prepared for the East Texas Council of Governments. March.

Yarwood, G., E. Tai, and J. Johnson. 2006. "Ozone Impacts in DFW of Proposed New EGUs and an Offset Strategy." Prepared for the Houston Advanced Research Center. August.