

Dallas-Fort Worth, Texas Final Area Designations for the 2008 Ozone National Ambient Air Quality Standards

This is the Technical Support Document (TSD) for the final area designations in the Dallas-Fort Worth (DFW) area for the 2008 ozone national ambient air quality standards (2008 ozone NAAQS).¹ Throughout this document "we," "our," and "us" means the United States Environmental Protection Agency (EPA).

Table 1 below identifies counties in Texas that EPA is designating as nonattainment for the 2008 ozone NAAQS as part of the DFW, Texas nonattainment area. In accordance with section 107(d) of the Clean Air Act, EPA must designate an area "nonattainment" if it is violating the 2008 ozone NAAQS or if it is contributing to a violation of the 2008 ozone NAAQS in a nearby area. EPA is designating two nonattainment areas within the state of Texas, the DFW nonattainment area and the Houston-Galveston-Brazoria (HGB) nonattainment area. The technical analysis supporting the designation and boundaries for the DFW nonattainment area is provided below. This TSD includes our evaluation of information submitted by the State of Texas and the public. The formal responses to comments received are provided in the 2008 ozone designation response to comments document which can be found in the electronic docket for this action, identified as EPA-HQ-OAR-2008-0476 at www.regulations.gov.

Area	Texas' Recommended Nonattainment Counties	EPA's Designated Nonattainment Counties
Dallas-Fort Worth, TX	Collin Dallas Denton Ellis Johnson Kaufman Parker Rockwall Tarrant	Collin Dallas Denton Ellis Johnson Kaufman Parker Rockwall Tarrant Wise

Table 1.	Counties in	n Texas Included	in the Dallas-Fort	Worth 2008 Ozon	e Nonattainment Area
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EPA is designating as "unclassifiable/attainment" for the 2008 ozone NAAQS the remaining counties in Texas that are not included in the table above or in the HGB nonattainment area (see the separate TSD for the HGB area).

The analysis below provides the basis for designated nonattainment area boundaries. It relies on our analysis of whether and which monitors are violating the 2008 ozone NAAQS, based on certified air quality monitoring data from 2008-2010 and on an evaluation of whether nearby areas are contributing to such violations. EPA has evaluated contributions from nearby areas based on a weight-of-evidence analysis considering the factors identified below. EPA issued guidance on December 4, 2008 that identified these factors as criteria EPA would consider in determining nonattainment area boundaries

¹ The primary 8-hour ozone standard, set to protect human health, was revised on March 27, 2008 (73 FR 16436) from 0.08 parts per million (ppm) to 0.075 ppm. The secondary ozone standard, set to protect human welfare and the environment, was revised to be consistent with the primary ozone standard.

and recommended that states consider these factors in making their designations recommendations to EPA.²

- 1. Air quality data (including the design value calculated for each Federal Reference Method (FRM) or Federal Equivalent Method (FEM)³ monitor in the area);
- 2. Emissions and emissions-related data (including location of sources and population, amount of emissions and emissions controls, and urban growth patterns);
- 3. Meteorology (weather/transport patterns);
- 4. Geography and topography (mountain ranges or other basin boundaries);
- 5. Jurisdictional boundaries (e.g., counties, air districts, existing nonattainment areas, Indian country, metropolitan planning organizations (MPOs))

Ground-level ozone generally is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOC) in the presence of sunlight. NOx and VOC emissions from a broad range of sources over a wide area typically contribute to violations of the ozone standards. Accordingly, EPA chose to examine the 5 factors with respect to the larger of the Combined Statistical Area (CSA) or Core Based Statistical Area (CBSA) associated with the air monitors that are measuring violations of the 2008 ozone NAAQS (the "violating monitor(s)").⁴ All data and information used by EPA in this evaluation are the latest available to EPA and/or provided to EPA by the State of Texas.

In EPA's designations guidance for the 2008 ozone NAAQS EPA recommends examining jurisdictional boundaries, thus we consider the larger boundaries of CSAs/CBSAs to establish the initial geographic scope for counties to be evaluated for their potential to contribute to violations of the NAAQS in nearby areas. In addition, certain factors used to establish CSAs and CBSAs are similar to the factors EPA is using in this technical analysis to determine if a nearby area is contributing to a violation of the 2008 ozone NAAQS. Each CSA/CBSA consists of counties containing at least one urban core plus adjacent counties that have a high degree of social and economic integration with the urban core(s) as measured by commuting ties. Congress required a similar approach in 1990 for areas classified as serious or above for the 1-hour ozone standard and EPA used the same basic approach in the designation process for the 1997 ozone NAAQS. Where a violating monitor is not located in a CSA or CBSA, EPA's guidance recommends using the boundary of the county containing the violating monitor as the starting point for considering the nonattainment area boundary.

² The December 4, 2008 guidance memorandum "Area Designations for the 2008 Revised Ozone National Ambient Air Quality Standards" refers to nine factors. In this TSD we have grouped the emissions-related factors together under the heading of "Emissions and Emissions-Related Data," which results in five categories of factors.

³ FRM monitors utilize a chemi-luminescent technique to measure ozone, while many FEM monitors use a technique involving ultraviolet photometry. FEM methods began to be developed in the late 1970s/early1980s and are now the most widely utilized methods for monitoring ozone levels. Refer to 40 CFR Part 53 for a more detailed description of FEM and FRM methods. <u>http://www.epa.gov/ttnamtil/files/ambient/criteria/reference-equivalent-methods-list.pdf</u>

⁴ Lists of CBSAs and CSAs and their geographic components are provided at

<u>www.census.gov/population/www/metroareas/metrodef.html</u>. The lists are periodically updated by the Office of Management and Budget. EPA used the most recent update, based on 2008 population estimates, issued on December 1, 2009 (OMB Bulletin No. 10-02).

Technical Analysis for Dallas-Fort Worth, TX

Figure 1 is a map of the DFW designated nonattainment area for the 2008 ozone standard. The map provides other relevant information, including the locations and design values of air quality monitors, county and other jurisdictional boundaries, relevant statistical area boundaries, the nonattainment area boundary for the 1997 ozone NAAQS, and major transportation arteries. The DFW CSA is comprised of seven CBSAs, all within Texas: (1) the Athens Micropolitan Statistical Area (Henderson County), (2) the Bonham Micropolitan Statistical Area (Fannin County); (3) the Dallas-Fort Worth-Arlington Metropolitan Statistical Area (Collin, Dallas, Delta, Denton, Ellis, Hunt, Johnson, Kaufman, Parker, Rockwall, Tarrant and Wise Counties); (4) the Gainesville Micropolitan Statistical Area (Cooke County); (5) the Granbury Micropolitan Statistical Area (Hood and Somervell Counties); (6) the Mineral Wells Micropolitan Statistical Area (Palo Pinto County); and (7) the Sherman-Denison Metropolitan Statistical Area (Grayson County). For this technical analysis, EPA evaluated all 19 counties in the DFW CSA, as well as five counties outside (to the south/southeast) of the CSA: Freestone, Limestone, McLennan, Navarro and Robertson.



Figure 1. Dallas-Fort Worth Designated Nonattainment Area

The boundary for the nonattainment area for the 1997 ozone NAAQS included the entire counties of Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwell, and Tarrant.

In March 2009,⁵ Texas recommended that the same counties as those designated nonattainment under the 1997 ozone standard, plus Hood County, be designated as nonattainment for the 2008 ozone NAAQS based on air quality data from 2005-2007 and uncertified data for 2008. Texas provided an update to the original recommendation in October 2011⁶ based on air quality data from 2008-2010. The State's recommendations are based on data from FEM monitors sited and operated in accordance with 40 CFR Part 58 and an analysis by the Texas Commission on Environmental Quality (TCEQ).

On December 9, 2011, EPA initiated the 120-day consultation process by notifying Texas that based on EPA's technical analysis of the DFW CSA the EPA intended to add Hood and Wise Counties to the nine counties Texas recommended be designated as the DFW ozone nonattainment area and requesting that if the State wished to provide additional information to EPA regarding the intended designations, it should do so by February 29, 2012. EPA also provided the public a 30-day opportunity to submit comments on EPA's intended designations in a December 20, 2011, announcement in the Federal Register (76 FR 78872). In January, EPA extended the public comment period to February 3, 2012 (January 19, 2012, 77 FR 2677). The public comments we received are provided in the electronic docket, identified as EPA-HQ-OAR-2008-0476 and located at www.regulations.gov. On February 29, 2012, Texas submitted comments and additional technical information to EPA.⁷ We also received comments from over 40 organizations and individuals.

After considering the State's original recommendations as well as additional information provided by the state of Texas and others during the public comment period, and based on EPA's technical analysis described below, EPA is designating ten counties in Texas (identified in Table 1 above) as "nonattainment" for the 2008 ozone NAAQS as part of the DFW nonattainment area. The ten counties include the nine counties recommended by the State of Texas and Wise County. EPA is designating Hood County as "unclassifiable/attainment."

Factor Assessment

Factor 1: Air Quality Data

For this factor, we considered 8-hour ozone design values (in ppm) for air quality monitors in counties in the DFW CSA based on data for the 2008-2010 period (i.e., the 2010 design value, or DV), which are the most recent years with certified air quality data. A monitor's DV is the metric or statistic that indicates whether that monitor meets or attains a specified air quality standard. The 2008 ozone NAAQS are met at a monitor when the annual fourth-highest daily maximum 8-hour average concentration, averaged over 3 years is 0.075 ppm or less. A DV is valid only if minimum data completeness criteria are met. See 40 CFR part 50 Appendix P. Where several monitors are located in a county (or a designated nonattainment area or maintenance area), the DV for the county or area is determined by the monitor with the highest DV.

The 2010 DVs for the ozone NAAQS for counties in the DFW CSA and five additional counties outside the CSA are provided in Table 2 below.

⁵ Initial 2008 ozone NAAQS designation recommendation letter from Governor Perry to Acting Regional Administrator Starfield, dated March 10, 2009.

⁶ Updated 2008 ozone NAAQS designation recommendation letter from Governor Perry to Regional Administrator Armendariz, dated October 31, 2011.

⁷ Letter from Governor Perry to Regional Administrator Armendariz, dated February 29, 2012.

County	State Recommended Nonattainment?	2008-2010 Design Value (parts per million or ppm)
Collin	Yes	0.077
Cooke	No	
Dallas	Yes	0.078
Delta	No	
Denton	Yes	0.080
Ellis	Yes	0.072
Fannin	No	
Grayson	No	
Henderson	No	
Hood	No	0.075
Hunt	No	0.064
Johnson	Yes	0.080
Kaufman	Yes	0.067
Palo Pinto	No	
Parker	Yes	0.075
Rockwall	Yes	0.074
Somervell	No	
Tarrant	Yes	0.086
Wise	No	
Counties outside of the DFW CSA		
Freestone	No	
Limestone	No	
McLennan	No	0.070
Navarro	No	8
Robertson	No	

Table 2. Air Quality Data.

Counties with design values exceeding the NAAQS are indicated in **bold** typeface.

Air quality monitors in Collin, Dallas, Denton, Johnson, and Tarrant Counties indicate a violation of the 2008 ozone NAAQS, therefore these counties are included in the nonattainment area. A county (or partial county) must also be designated nonattainment if it contributes to a violation in a nearby area. Each county without a violating monitor that is located near a county with a violating monitor has been evaluated, as discussed below, based on the five factors.

The Eagle Mountain Lake ozone monitor (48-439-0075) in Tarrant County, which is less than ½ mile from Wise County, violates the 2008 ozone NAAQS with a 2008-2010 DV of 0.085 ppm. The 2008-2010 DV for the Hood County ozone monitor (48-221-0001) was 10 parts per billion (ppb) lower, with a DV of 0.075 ppm, which meets the 2008 ozone NAAQS.

Freestone, Limestone, McLennan, Navarro and Robertson counties do not all have air quality monitors. Those that do however, are not showing a violation of the 2008 ozone standard. In addition, these five counties are not adjacent to, or nearby, a county with a violating monitor.

⁸ The monitor in Navarro County began operation in June 2009 and thus does not have a design value for 2008-2010.

Factor 2: Emissions and Emissions-Related Data

EPA evaluated emissions of ozone precursors (NOx and VOC) and other emissions-related data that provide information on areas contributing to violating monitors. The emissions and emissions-related data we are evaluating include data from the 2008 National Emissions Inventory (NEI); the Barnett Shale Special Inventory provided by the TCEQ; population density and degree of urbanization; traffic data; and worker data. Each of these factors is described below.

Emissions Data

Significant emissions levels in a nearby area indicate the potential for the area to contribute to monitored violations of the NAAQS. EPA evaluated county-level emission data for NOx and VOC derived from (1) the 2008 NEI, version 1.5, (2) a 2009 emissions inventory of oil and gas activities in the Barnett Shale, and (3) emissions inventory updates provided by Texas. (See the February 29, 2012, letter from Texas Governor Perry and <u>http://www.epa.gov/ttn/chief/net/2008inventory.html</u>). Based on information we received from Texas, we revised the 2008 VOC emissions inventory for Hood and Wise Counties. The revised 2008 VOC emissions inventory for Hood County is 8,739 tons per year (tpy), down from 9,547 tpy reported in NEI version 1.5. The revised emissions inventory for Wise County is 17,609 tpy, down from the 23,657 tpy reported in NEI version 1.5. These reductions in the VOC emissions for Hood and Wise Counties are due to revised oil and gas sector pneumatic emissions for 2008 that Texas submitted to the NEI in October 2011. This revised data was not reflected in NEI version 1.5.

Table 3 indicates emissions of NOx and VOC (expressed in tpy) for violating and nearby counties that we considered for inclusion in the Dallas-Fort Worth CSA.

County	State Recommended Nonattainment?	NOx (tpy)	VOC (tpy)
Collin	Yes	10,322	14,503
Cooke	No	3,853	5,790
Dallas	Yes	51,023	63,473
Delta	No	1,016	462
Denton	Yes	17,421	24,932
Ellis	Yes	15,768	6,543
Fannin	No	2,165	1,207
Grayson	No	5,919	7,401
Henderson	No	3,573	6,067
Hood	No	5,515	8,739
Hunt	No	3,688	3,765
Johnson	Yes	31,769	10,163
Kaufman	Yes	5,868	3,510
Palo Pinto	No	3,348	7,464
Parker	Yes	9,550	11,708
Rockwall	Yes	1,859	2,047
Somervell	No	698	921
Tarrant	Yes	56,408	49,021
Wise	No	11,911	17,609
	Area-wide:	241,674	245,325

Table 3. Total 2008 NOx and VOC Emissions*

*With VOC emissions revisions for Hood and Wise Counties submitted by TCEQ. Counties with monitors indicating a violation of the NAAQS are indicated in **bold**.

Subsequent to development of the 2008 NEI, the TCEQ prepared an emissions inventory of NOx and VOC emissions resulting from Barnett Shale oil and gas production, transmission, processing, and related activities during calendar year 2009.⁹ Table 4 below presents an updated Barnett Shale Area Special Inventory of NOx and VOC emissions from oil and gas production activities for the counties in the Dallas-Fort Worth CSA. EPA also considered the additional contribution of NOx and VOC emissions for the DFW CSA counties.

http://www.tceq.texas.gov/airquality/point-source-ei/psei.html#barnett2. Reference Barnett Shale Area Special Inventory, Phase Two.

County	State Recommended Nonattainment?	NOx (tpy)	VOC (tpy)
Collin	Yes		
Cooke	No	76	490
Dallas	Yes	0	5
Delta	No		
Denton	Yes	429	3,523
Ellis	Yes	120	49
Fannin	No		
Grayson	No		
Henderson	No		
Hood	No	6,903	2,113
Hunt	No		
Johnson	Yes	1,101	1,614
Kaufman	Yes		
Palo Pinto	No	1,226	833
Parker	Yes	743	2,420
Rockwall	Yes		
Somervell	No	1,119	221
Tarrant	Yes	415	1,083
Wise	No	2,520	6,032
	Area-wide:	14,652	18,383

Table 4. TCEQ 2009 Barnett Shale Area Special Inventory.

Counties with monitors indicating a violation of the NAAQS are indicated in **bold**.

The counties in the DFW CSA with the highest emissions of NOx and VOC are Collin, Dallas, Denton, Ellis, Johnson, Parker, Tarrant, and Wise. Together, these counties account for 84 percent of the NOx emissions and 81 percent of the VOC emissions for the entire area for 2008.

Wise County also has comparatively high emissions of NOx and VOC. Based on just the adjusted 2008 NEI data, Wise County's emissions of VOC at 17,609 tpy are the 4th highest in the 19-county CSA, and Wise County's NOx emissions are the 6th highest of the counties in the CSA.

In addition to providing updated 2008 emissions inventory data for Hood and Wise Counties, Texas provided information indicating that: Hood County NOx emissions from point sources decreased from 5,964 tpy in 2002 to 1,178 tpy in 2010; and that Wise County NOx emissions from point sources decreased from 2,895 tpy in 2002 to 2,163 tpy in 2010.

EPA also received comments and information regarding current emissions from oil and gas activities from Hood County representatives.¹⁰ This information indicates that well exploration and development within Hood County has declined significantly since 2009, when TCEQ's special inventory was conducted.

¹⁰ These letters and all other comments received are in the docket for this action, identified as EPA-HQ-OAR-2008-0476 at www.regulations.gov.

Additionally, EPA received comments concerning the impact of emissions from five counties outside the DFW CSA, Freestone, Limestone, McLennan, Navarro, and Robertson Counties, on air quality in the core CSA counties. These counties are south and southeast of the DFW nonattainment area. The NOx and VOC emissions from these counties are presented in Table 5 below.

Table 5. Total 2008 NOx and VOC Emissions from the 2008 NEI, version 1.5 for five counties outside of the DFW CSA.

County	State Recommended Nonattainment?	NOx (tpy)	VOC (tpy)
Freestone	No	18,773	10,595
Limestone	No	19,214	5,749
McLennan	No	10,616	6,980
Navarro	No	5,920	4,457
Robertson	No	11,528	4,893

The five counties in Table 5 above have comparatively high levels of emissions of NOx and VOC and thus have the potential to contribute to monitored violations, but these counties are not in, or nearby, a county with a violating monitor.

Population density and degree of urbanization

EPA evaluated the population and vehicle use characteristics and trends of the area as indicators of the probable location and magnitude of non-point source emissions. These include ozone precursor emissions from on-road and off-road vehicles and engines, consumer products, residential fuel combustion, and consumer services. Areas of dense population or commercial development are an indicator of area source and mobile source NOx and VOC emissions that may contribute to ozone formation that contributes to nonattainment in the area. Rapid growth in population or vehicle miles traveled (VMT) in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that it may be appropriate to include such perimeter area(s) as part of the nonattainment area. Table 6 presents the population, population density, and population growth information for each county in the area.

County	State Recommended Nonattainment?	2010 Population	2010 Population Density (1000 pop/sq mi)	Absolute change in population (2000-2010)	Population % change (2000-2010)
Collin	Yes	782,341	0.88	282,143	56.4
Cooke	No	38,734	0.04	1,979	5.4
Dallas	Yes	2,368,139	2.6	142,691	6.4
Delta	No	5,231	0.02	-106	-2.0
Denton	Yes	662,614	0.69	223,647	50.9
Ellis	Yes	149,610	0.16	37,228	33.1
Fannin	No	33,915	0.04	2,575	8.2
Grayson	No	120,877	0.12	9,891	8.9
Henderson	No	78,532	0.08	4,990	6.8
Hood	No	51,182	0.12	9,719	23.4
Hunt	No	86,129	0.10	9,199	12.0
Johnson	Yes	150,934	0.21	22,967	17.9
Kaufman	Yes	103,350	0.13	31,268	43.4
Palo Pinto	No	28,111	0.03	1,028	3.8
Parker	Yes	116,927	0.13	27,690	31.0
Rockwall	Yes	78,337	0.53	34,457	78.5
Somervell	No	8,490	0.04	1,660	24.3
Tarrant	Yes	1,809,034	2.01	354,603	24.4
Wise	No	59,127	0.06	9,727	19.7
	Area-wide:	6,731,614	0.46	1,207,356	21.9

Table 6. Population and Growth.

Sources: U.S. Census Bureau population estimates for 2010 as of August 4, 2011 (http://factfinder2.census.gov/faces/tableservices/jsf/pages/productview.xhtml?pid=DEC_10_PL_GCTP L2.STO5&prodType=table)

Counties with monitors indicating a violation of the NAAQS are indicated in **bold**.

The Dallas-Fort Worth area is a large metropolitan area with a population approaching 7 million people. For the purposes of determining the boundary of the 2008 ozone nonattainment area, EPA evaluated 22 counties in the greater DFW area with a combined population of 6,731,614 people and an average population density of 460 people per square mile.

Dallas and Tarrant Counties have the highest and most dense populations. Dallas County has approximately 2.4 million people and a population density of 2,600 people per square mile, and Tarrant County has approximately 1.8 million people and a population density of 2,010 people per square mile. Two other counties, Collin and Denton are also densely populated; each has more than 500,000 people and a population density exceeding 500 people per square mile.

There are eight additional counties in this area with populations exceeding 50,000 people and/or population densities exceeding 100 people per square mile. These counties include: Ellis, Grayson, Hood, Johnson, Kaufman, Parker, and Rockwall. These counties are characterized by population counts that range between approximately 50,000 and 150,000 people and/or population densities that range from 120 to 530 people per square mile.

Ten of the counties in this area experienced population growth between 2000 and 2010 in excess of approximately 10,000 people. The population of four of these counties grew by more than 100,000 people during the past decade: Collin County (+282,143 people), Dallas County (+142,000 people), Denton County (+223,647 people), and Tarrant County (+354,603 people). Six additional counties

experienced population growth that ranged from approximately 10,000 to 50,000 people: Ellis, Johnson, Kaufman, Parker, Rockwall, and Wise Counties.

A final population and growth metric evaluated by EPA was the percent change in population during the period from 2000 to 2010. During this decade, eight of the 22 counties experienced a percent change in population that exceeded 10 percent: Collin (+18.5%), Denton (+18.7%), Ellis (+13.5%), Kaufman (+17.6%), Parker (+15.4%), Rockwall (+25.7%), Somervell (+14.4%), and Tarrant (+12.2%) Counties.

The attachment to this document includes Figure 2, Dallas-Fort Worth Ozone and Ozone Precursor Monitoring Network, with Population Density; and Figure 3, Population Density Change in Percentage Between the 2000 and 2010 Census for the Dallas-Fort Worth Ozone and Ozone Precursor Monitoring Network, which present graphical information on population density and growth for the DFW area.

Table 7 below presents population data for the five outlying counties that EPA also evaluated for inclusion in the DFW nonattainment area.

County	State Recommended Nonattainment?	2010 Population	2010 Population Density (1000 pop/sq mi)	Absolute change in population (2000-2010)	Population % change (2000-2010)
Freestone	No	19,816	0.02	1,949	10.9
Limestone	No	23,384	0.02	1,333	6
McLennan	No	234,906	0.22	21,389	10
Navarro	No	47,735	0.04	2,611	5.8
Robertson	No	16,622	0.01	622	3.9

Table 7. Population and Growth for the five counties outside of the DFW CSA

McLennan County has a population greater than 50,000 and a population density greater than 100 people per square mile; and Freestone and McLennan counties have experienced population growth of at least 10 percent, indicating the potential to contribute to violations. However, as indicated earlier in this TSD, the five counties listed in Table 7 do not have violating monitors, nor are they nearby violating monitors.

<u>Traffic data</u>

EPA evaluated the total VMT for each county. In combination with the population/population density data and the location of main transportation arteries (see above), this information helps identify the probable location of non-point source emissions. A county with high VMT is generally an integral part of an urban area and indicates the presence of motor vehicle emissions that may contribute to ozone formation that contributes to nonattainment in the area. Rapid population or VMT growth in a county on the urban perimeter signifies increasing integration with the core urban area, and indicates that such perimeter area(s) may be appropriate to include in the nonattainment area. Table 8 shows traffic data, including 2008 VMT and VMT growth for each county in the DFW CSA.

Table 8. Traffic Data.

Texas County	State Recommended	2008 VMT*	% Change in VMT
	Nonattainment?	(million miles)	(2002 - 2008)
Collin	Yes	6,198	+33
Cooke	No	636	+16
Dallas	Yes	26,625	+14
Delta	No	72	-4
Denton	Yes	5,507	+27
Ellis	Yes	1,893	+49
Fannin	No	334	+9
Grayson	No	1,364	+3
Henderson	No	768	+30
Hood	No	443	+46
Hunt	No	1,046	+26
Johnson	Yes	1,432	+47
Kaufman	Yes	1,548	+38
Palo Pinto	No	397	+3
Parker	Yes	1,280	+41
Rockwall	Yes	676	+15
Somervell	No	121	+27
Tarrant	Yes	16,741	+17
Wise	No	969	+16
	Area-wide:	68,050	

* MOBILE model VMTs are those inputs into the 2008 NEI version 1.5. Counties with monitors indicating a violation of the NAAQS are indicated in **bold**.

The VMT is an important metric as an indicator of potential contribution to ground level ozone concentrations. Commuters in the DFW area traveled a total of approximately 68 billion miles during calendar year 2008. Four counties in the DFW area, Collin, Dallas, Denton, and Tarrant Counties, each have total VMT for calendar year 2008 in excess of 5 billion miles. Dallas and Tarrant Counties have particularly high VMT of approximately 27 and 18 billion miles, respectively. An additional seven counties have 2008 VMT in the range of approximately 1 - 2 billion miles; these counties are Ellis, Grayson, Hunt, Johnson, Kaufman, Parker, and Wise Counties.

Most of the counties in the DFW area have experienced growth in VMT for the period from 2002 – 2008. The growth in VMT for 15 of these counties exceeds 10 percent, and for 10 of those counties the growth rate exceeded 25 percent. Five counties in particular have comparatively high VMT growth for this period: Ellis County (+49%), Hood (+46%), Johnson County (+47%), Kaufman County (+38%), and Parker County (+41%). However, of the 19 counties listed in Table 8, Ellis, Kaufman, Johnson and Parker counties rank 5th, 6th, 7th and 9th in absolute VMT, respectively, while Hood ranks 15th.

Table 9 below provides the VMT data for the five outlying counties that EPA evaluated for inclusion in the DFW nonattainment area. These counties have VMT that is comparatively lower than that of the counties recommended by Texas for inclusion in the nonattainment area, with the exception of Rockwall County.

Texas County	State Recommended Nonattainment?	2008 VMT* (million miles)	% Change in VMT (2002 – 2008)
Freestone	No	650	+13
Limestone	No	315	+18
McLennan	No	275	+12
Navarro	No	800	-37
Robertson	No	345	+17

Table 9. Traffic Data for the Five Counties Outside of the DFW CSA

In addition to VMT, we have evaluated worker data collected by the US Census Bureau¹¹ for the nine counties recommended by Texas for inclusion in the nonattainment area and two additional counties, Hood and Wise, that EPA considered for inclusion in the nonattainment area to inform our designations decisions. The data in Table 10 below are 2010 data and reflect an analysis of work destinations (all jobs) for residents in these 11 counties.

Table 10. Worker Data

County	State Recommended Nonattainment?	Number of County Residents who Work	Number of County Residents who Work in Counties with Violating Monitors	Percent of County Residents who Work in Counties with Violating Monitors
Collin	Yes	364,301	320,714	88.0%
Dallas	Yes	975,350	852,017	87.3%
Denton	Yes	300,910	265,220	88.1%
Ellis	Yes	63,773	37,071	58.1%
Hood	No	18,133	6,932	38.2%
Johnson	Yes	65,252	51,883	79.5%
Kaufman	Yes	46,344	28,491	61.4%
Parker	Yes	48,779	28,260	57.9%
Rockwall	Yes	34,716	22,255	64.1%
Tarrant	Yes	785,269	696,283	88.6%
Wise	No	22,650	10,374	45.8%
	Area-wide:	2,725,477	2,319,500	85.1%

Counties with monitors indicating a violation of the NAAQS are indicated in **bold**.

For each of the 11 counties shown in Table 10 above, a significant fraction of residents work in the counties with violating monitors, thus contributing to mobile source emissions. This high percentage of workforce interchange indicates integration with the urban core counties.

Table 11 below provides the worker data for the five outlying counties that EPA evaluated for inclusion in the DFW nonattainment area.

¹¹ The worker data can be accessed on the internet at <u>http://onthemap.ces.census.gov/</u>. Please see Appendix 1 in the Attachment for instructions to access the worker data.

County	State Recommended Nonattainment?	Number of County Residents who Work	Number of County Residents who Work in Counties with Violating Monitors	Percent of County Residents who Work in Counties with Violating Monitors
Freestone	No	7,681	1,781	23.1%
Limestone	No	8,720	1,805	20.6%
McLennan	No	96,116	10,730	11.1%
Navarro	No	19,865	5,174	26.0%
Robertson	No	7,188	258	3.5%

Table 11. Worker Data for the five counties outside of the DFW CSA

For each of the five counties shown in Table 11 above, a smaller fraction of county residents work in the counties with violating monitors, which suggests that at this time there is little, if any integration with the urban core counties.

Factor 3: Meteorology (weather/transport patterns)

EPA evaluated available meteorological data to help determine how meteorological conditions, such as weather, transport patterns and stagnation conditions, would affect the fate and transport of precursor emissions contributing to ozone formation. Based on past research by EPA and TCEQ the DFW area is generally characterized as having ozone exceedances with lower wind speeds and winds from many directions but the more frequent directions are easterly through southwesterly winds. Light winds with weak frontal passages and conversion zones also are a common meteorological condition that often leads to high ozone in the DFW area. EPA's analysis of meteorology is focused on the meteorology and transport phenomena that results in transport of air emissions to monitors in the DFW area that have monitored exceedances of the 2008 ozone standard.

The attachment to this document includes Figure 2, Dallas-Fort Worth Ozone and Ozone Precursor Monitoring Network, with Population Density, which provides locations of major stationary sources and locations of ambient monitors with their design values.

EPA has performed 24-hour wind back trajectories (an analysis of meteorological/transport patterns) specifically on days when certain monitors (identified below) in the DFW area measured an exceedance of the 2008 NAAQS. These analyses were conducted to better understand the area's meteorological transport conditions using the National Oceanic and Atmospheric Administration Hybrid Single Particle Lagrangian Integrated Trajectory Model (NOAA HYSPLIT or HYSPLIT). The HYSPLIT model yields an estimate of the path an air mass has traveled before reaching a monitor at a specific location and time. Specifically, the model provides the centerline of the probable path. By knowing where an air mass has traveled before reaching a monitor what potential areas and emission sources could have contributed to the exceedance.

The HYSPLIT trajectories for 2008-2010 exceedance days at the Keller monitor in Tarrant County were conducted and the resulting trajectories were overlaid on Figure 2 in the attachments and are shown in Figure 4. We focused on the Keller and Eagle Mountain Lake monitors in Tarrant County and the Parker County monitor because the Keller and Eagle Mountain Lake monitors have recorded some of the highest ozone levels in the region, and inclusion of the Parker County monitor provided a good cross-section of the monitors in the western DFW area that experienced exceedances in the 2006-2010 period.

In analysis of the DFW conceptual model for ozone exceedances, these monitors also seemed to have the most potent to be impacted by emissions from Hood or Wise Counties. Since the 2008-2010 data for the Keller monitor is only for three years, we evaluated additional years to better understand the meteorological transport conditions that exist during ozone exceedances. When we are developing a conceptual model for understanding what types of meteorology are present when ozone exceedances occur in an area we evaluate 5 to 10 years worth of meteorological data. By considering a longer period of time, we have greater assurance that the most representative weather conditions are considered and control strategies and decision making are not driven by unusual meteorology.

There are three additional figures in the attachment that include a zoom view for each of the Keller, Eagle Mountain Lake and Parker County monitors. These are labeled as Figures 5a through 5c. These zoom views are HYSLPIT 24-hour back trajectories for each of these monitors on days when they had exceedances of the 75 ppb standard. Evaluation of the back trajectories for the Keller, Eagle Mountain Lake, and Parker County monitors indicates that the areas upwind of the monitors prior to an ozone exceedance include all the counties in the 1997 8- hour DFW nonattainment area (Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall and Tarrant counties), and also Wise and Hood Counties. The additional back trajectories for the Eagle Mountain Lake and Parker County monitors further support that air that is transported from Hood and Wise counties ends up in the area of the monitor when ozone exceedances are observed.

We did receive comments that we should not consider potential impacts at the Parker monitor from Hood County emissions since the Parker monitor's 2010 DV (2008-2010 data) is attaining the standard with a 75 ppb. We evaluated the Parker monitor because it is part of the existing 9-county DFW nonattainment area for the 1997 8-hour ozone NAAQS and Parker County was recommended by Texas to be part of the DFW nonattainment area for the 2008 8-hour ozone NAAQS. In review of the 2006-2010 HYSPLIT back trajectories for the Parker County monitor ozone exceedances, some of the trajectories pass through the Hood County area. However, since the Parker monitor is attaining the 2008 NAAQS, we did not put significant weight on the back trajectories for the Parker County monitor.

TCEQ SOURCE APPORTIONMENT MODELING

The TCEQ has developed CAMx photochemical modeling for previous ozone attainment demonstrations. The TCEQ did additional modeling using these CAMx databases to provide source apportionment modeling that assessed the potential contribution of Hood and Wise county emissions to modeled high ozone values in the DFW area. The TCEQ's analysis was performed for a period of a month in early 2006 summer (May 31 to July 1) for three monitors that EPA had performed back trajectories. They also evaluated this base episode with a future year analysis of 2012 (2006 meteorology with 2012 emission estimates). In summarizing this work, they provided average and maximum impacts to daily 8-hour modeled exceedances in the base case (2006) and 2012. The TCEQ indicated the impacts were small and supported not including Hood or Wise counties.

EPA Assessment:

Source apportionment analysis can be a good tool to combine the meteorology/transport of air parcels during high ozone days with the emissions of specific areas to evaluate potential impact on ozone levels from emissions in specific source areas, Hood and Wise County emissions in this case. The EPA appreciates the efforts of TCEQ to provide the modeling to aid in decisions on designations.

One of EPA's observations regarding TCEQ's Source Apportionment Modeling (SAM) is that the modeling is not inclusive of an entire ozone season. Evaluations of the conceptual model for high ozone in DFW by TCEQ, EPA and others indicates that high ozone in DFW is roughly a bimodal distribution with lower peaks in early summer (May-June) and the highest values in mid to late-summer (July-September) and that the mid to late summer has some different meteorological/transport regimes than the early summer episodes. Therefore, TCEQ's SAM does not include a large number of days and does not include all of the meteorology regimes conducive for ozone events in DFW and is missing the events that happen in mid to late-summer that often set the DFW area's DV. As a result, it may be appropriate to place more weight on the maximum estimated impact and the number of days with sizeable impacts on violating monitors as compared to average impact. Another observation is that the evaluation used modeled exceedances for contribution and the modeling is underestimating exceedances on many days and therefore is underestimating the number of days of potential contribution. Modeling is significantly under predicting peaks by 5-20 ppb at critical monitors; therefore we also looked at contribution at lower modeled values (70 ppb). The EPA analyzed the 2006 and 2012 modeling information, but felt the 2012 analysis took into account recent control measures that TCEO has implemented to lower DFW ozone levels and the 2012 was closer to what emission levels are at the time we are making these designation decisions. We have summarized the information provided by TCEQ in the letter from Governor Rick Perry dated February 29, 2012. This summary of SAM estimates of impacts for Hood and Wise County emissions is included in Table 12.

Table 12. TCEQ Source Apportionment – Hood and Wise County Anthropogenic Emissions Impact (in ppb) on Modeled Ozone exceedances

		HOOD		WISE	
Site	Monitor Site	AVG	MAX	AVG	MAX
EMTL	Eagle Mountain Lake	0.010	0.03	0.520	0.81
KELC	Keller	0.010	0.02	0.010	0.03
WTFD	Parker – Weatherford	0.030	0.16	0.670	1.29

In the course of our review, we requested and TCEQ provided additional modeling files that included SAM results at most of the monitors in DFW. EPA has reviewed this additional information and did discover some errors/discrepancies in TCEQ's spreadsheets.¹² EPA shared the errors/discrepancies with TCEQ. TCEQ had also used the average of the predicted ozone levels in the grid cells around the monitor, and EPA guidance is to use the maximum, so EPA reanalyzed the data using the maximum ozone levels in the grid cells around a monitor.

In analyzing SAM for a specific area for designation we evaluated the average impact, maximum impact, and an additional metric, the number of days where impacts may be high enough that reductions might be beneficial in development of an attainment demonstration. Often in attainment demonstration modeling, controlling of sources is evaluated and results in only a few tenths of a ppb change, therefore we used a 1% of the standard cut point for days where we would consider Hood or Wise County's impact to be significant. We determined the number of days an impact was over 1% (0.75 ppb) on a modeled exceedance of the 75 ppb standard and also model exceedances greater than 70 ppb. Also since this SAM misses the mid to late summer meteorology/transport that results in high ozone and is not a full picture of DFW ozone exceedances, we put more weight on peaks and # of days over 0.75 ppb at area monitors (NA and near NA 2008-2010). The corrected SAM and EPA's assessment of TCEQ's SAM is included in Table 13 and Table 14.

¹² Additional information has been included in the docket for this action and additional information is included in a zipped file "TCEQ back-up information.zip and EPA assessment of Matagorda.zip."

		HOOD Modeled days >75 ppb (2012)			HOOD Modeled days >70 ppb (2012)		
Site		AVG (ppb)	MAX (ppb)	# of days >0.75 ppb	AVG (ppb)	MAX (ppb)	# of days >0.75 ppb
DENT	Denton	0.06	0.48	in the surjet of the PFC	0.06	0.48	
EMTL	Eagle Mtn.	0.10	0.46		0.19	1.12	1
KELC	Keller	0.05	0.25		0.05	0.25	
GRAP	Grapevine	0.01	0.05		0.01	0.05	
FWMC	FW NW	0.03	0.17		0.07	0.45	
FRIC	Frisco	0.01	0.02		0.01	0.02	
$WTFD^1$	Parker - Weatherford	0.85	2.26	4	0.77	2.26	4
CLEB	Cleburne	0.01	0.03		0.01	0.03	
ARLA	Arlington	0.01	0.02		0.00	0.02	
PIPT	Pilot Point	0.04	0.23		0.04	0.23	
GRAN ¹	Granbury (Hood)	2.34	5.77	9	2.63	5.77	9
	Total Occurrences						

Table 13. Corrected TCEQ Source Apportionment with EPA's assessment - Hood County Anthropogenic Emissions

¹ Based on most recent certified monitoring data, the Parker and Hood County monitors have a DV of 75 ppb, which is in attainment of the 2008 8-hour ozone NAAQS.

WISE WISE Modeled days >75 Modeled days >70 ppb ppb (2012) (2012)AVG MAX AVG MAX Site (ppb) (ppb) # of days >0.75 ppb (ppb) (ppb) # of days >0.75 ppb Denton DENT 0.13 1.15 0.128 1.15 1 1 Eagle Mtn. 0.36 0.86 0.677 5.03 EMTL 1 2 Keller **KELC** 0.05 0.5 0.360 0.50 GRAP Grapevine 0.07 0.99 0.293 3.85 2 1 FWMC FW NW 0.09 1.08 0.104 1.08 1 1 FRIC 0.03 0.36 0.031 0.36 Frisco WTFD¹ Parker - Weatherford 0.85 7.48 1.217 7.48 2 1 Cleburne 0.88 0.88 CLEB 0.12 0.120 1 1.72 0.124 ARLA Arlington 0.17 1.72 1 1 PIPT Pilot Point 0.03 0.14 0.028 0.14 Midlothian 1.09 1.09 MDLO 0.12 1 0.111 1 **GRAN**¹ Granbury (Hood) 0.308 0.33 3.07 1 3.07 GRVL Greenville 0.01 0.007 0.01 0.03 **Total Occurrences** 6 occurrences over 4 days 9 occurrences over 5 days

Table 14. Corrected TCEQ Source Apportionment with EPA's assessment - Wise County Anthropogenic Emissions

¹ Based on most recent certified monitoring data, the Parker and Hood County monitors have a DV of 75 ppb, which is in attainment of the 2008 8-hour ozone NAAQS

do not have a large contribution on any days using the 75 ppb modeled threshold and only one day above with a contribution over 0.75 ppb using the 70 ppb modeling threshold on current DFW monitors (not including Parker or Hood monitors). Some concerns were raised that the SAM may include higher emissions than are currently present for Hood County sources and thus the SAM may be overestimating Hood County emission impacts. Even without considering the potential uncertainty in the emissions for Hood County in the modeling, it does not appear that the modeling shows significant impacts on monitors that are currently violating the standard. SAM does show significant impact on Parker County from Hood at times but as mentioned previously, we did not put significant weight on these impacts because Parker County is currently attaining the standard. In our evaluation of the Wise County SAM, Wise County emissions have a larger average and maximum contribution than Hood County emissions using the 75 ppb modeled exceedance threshold. Furthermore, when using this threshold, Wise County emissions resulted in 6 occurrences (over 4 days) of an impact of more than 0.75 ppb days on DFW monitors (not including Parker or Hood monitors). To take into account concerns that the modeled period is not inclusive of all conditions that lead to high ozone and the modeling underestimation concerns, we also evaluated contributions to all modeled values of greater than 70 ppb. This analysis indicated Wise County emissions had even larger impacts of up to 5 ppb on the Eagle Mountain Lake monitor, which is one of the monitors in DFW that sets the DV for the DFW area. This analysis also indicated that Wise County emissions resulted in 9 occurrences (over 5 days) that impacts of more than 0.75 ppb occurred at DFW area monitors (not including Parker or Hood

Factor 4: Geography/topography (mountain ranges or other air basin boundaries)

county monitors). It does appear that the SAM provides evidence for inclusion of Wise County.

In both Table 13 and Table 14, the Parker and Hood County information is highlighted in green as these monitors are currently in attainment at the time of designation based on 2008-2010 data. As a result, we have put little weight on the impact of emissions on Hood and Parker monitors. Hood County emissions

The geography/topography analysis evaluates the physical features of the land that might affect the air shed and, therefore, the distribution of ozone over the area. The DFW area does not have any geographical or topographical barriers significantly limiting air pollution transport into or within its air shed. Therefore, this factor did not play a significant role in this evaluation.

Factor 5: Jurisdictional boundaries

Once we identified the general areas we anticipated we would recommend be included in the nonattainment area, we then considered existing jurisdictional boundaries for the purposes of providing a clearly defined legal boundary and to help identify the areas appropriate for carrying out the air quality planning and enforcement functions for nonattainment areas. Examples of jurisdictional boundaries include existing or prior nonattainment area boundaries for ozone or other urban-scale pollutants, county lines, air district boundaries, township boundaries, areas covered by a metropolitan planning organization, state lines, Reservation boundaries, and urban growth boundaries. Where existing jurisdictional boundaries were not adequate or appropriate to describe the nonattainment area, other clearly defined and permanent landmarks or geographic coordinates were considered.

The DFW area has previously established nonattainment boundaries associated with the 1-hour and 1997 8-hour ozone NAAQS. Texas has recommended the boundary for the 2008 ozone NAAQS be the same as that for the 1997 ozone NAAQS.

In addition to the CSA boundary, an important boundary is that of the metropolitan planning organization (MPO). In the DFW area, the MPO is the North Central Texas Council of Governments, which is responsible for planning and implementing transportation programs and projects aimed at reducing congestion, enhancing mobility, and improving air quality. The 10 counties in the DFW 2008 ozone nonattainment area are in the same MPO boundary.

Freestone, Limestone, McLennan, Navarro and Robertson counties are outside of the DFW CSA. While Navarro County is inside the DFW MPO boundary, Freestone, Limestone, McLennan and Robertson counties are not. Furthermore, Freestone, Limestone and McLennan counties are in an MPO boundary that does not include Robertson County.

Conclusion

Based on the assessment of factors described above, EPA has concluded that the following counties will be included as part of the DFW ozone nonattainment area because they have air quality monitors that indicate a violation of the 2008 ozone NAAQS, or because they are contributing to a violation in a nearby area: Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwell, Tarrant, and Wise Counties. These are the same counties that were included in the DFW nonattainment area for the 1997 ozone NAAQS, with the addition of Wise County.

The air quality monitors in Collin, Dallas, Denton, Johnson, and Tarrant Counties indicate violations of the 2008 ozone NAAQS based on the 2010 DVs, therefore these counties are included in the nonattainment area.

Ellis, Kaufman, Parker, Rockwall, and Wise Counties are nearby counties that do not have monitors indicating ambient ozone concentrations in excess of 75 ppb, but EPA has concluded that these areas contribute to observed violations of the 2008 ozone standard in nearby counties, through emissions from point sources and other, non-point sources (e.g., vehicles and other small area sources).

Collin, Dallas, Denton, Ellis, Johnson, Parker, Tarrant, and Wise Counties have among the highest NOx and VOC emissions in the area. Each of these counties either has a monitor indicating a violation of the 2008 ozone NAAQS or is adjacent to one or more such counties.

Collin, Dallas, Denton, Ellis, Grayson, Hood, Johnson, Kaufman, Parker, Rockwall, Somervell, Tarrant, and Wise Counties ranked comparatively high for factors related to population statistics, and Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise Counties ranked comparatively high for factors related to traffic data.

EPA's meteorological assessment when ozone exceedances of the 2008 ozone standard have been monitored within the DFW area supports the consideration of inclusion of the existing 9-county nonattainment area (Dallas, Tarrant, Collin, Denton, Ellis, Johnson, Parker, Rockwall, and Kaufman counties) and Hood and Wise counties.

Collin County: Recommended for inclusion by Texas and has a violating monitor, so will be included.

Dallas County: Recommended for inclusion by Texas and has a violating monitor, so will be included.

Denton County: Recommended for inclusion by Texas and has a violating monitor, so will be included.

Ellis County: Recommended for inclusion by Texas; has 2008 NEI emissions of 15,768 tons of NOx and 6,543 tons of VOC; there are 160 people per square mile; has a 2010 population of 149,610 with a growth rate of 13.5 percent between 2000 and 2010; total VMT is 1.9 billion miles. Winds often flow from the south, southeast and east, so emissions from Ellis County often contribute to violations in other DFW counties. These factors, in conjunction with the number of commuters and growth rate support the inclusion of Ellis County in the nonattainment area.

Hood County: Has 2008 NEI emissions of 5,515 tons of NOx and 8,739 tons of VOC, with TCEQ 2009 Barnett Shale Special Inventory emissions of an additional 6,903 tons of NOx and 2,113 tons of VOC; there are 120 people per square mile; has a 2010 population of 51,182 with a growth rate of 9.2 percent between 2000 and 2010; total VMT is 443 million miles. Emissions from this county have grown considerably, due primarily to oil and gas development. Back trajectories show that at times Hood County emissions could potentially contribute to observed violations in other counties. Much of the emissions from Hood County were based on oil and gas activities. We received information that exploration has dropped dramatically, calling into question whether current emissions are as high as estimated by TCEQ's special inventory. As discussed, we are giving little weight to the fact that Hood County emissions contribute to exceedances in Parker County because Parker County is currently monitoring attainment. Hood County is some distance from monitors that are currently violating the 2008 ozone standard. The SAM analysis conducted by TCEQ also does not indicate a significant impact from Hood County on currently violating monitors. Taken together, the amount of emissions, the distance from the monitor, the population and the VMT do not warrant inclusion of Hood County as part of the nonattainment area.

Johnson County: Recommended for inclusion by Texas and has a violating monitor, so will be included.

Kaufman County: Recommended for inclusion by Texas; has 2008 NEI emissions of 5,868 tons of NOx and 3,510 tons of VOC; there are 130 people per square mile; has a 2010 population of 103,350 with a growth rate of 17.6 percent between 2000 and 2010; total VMT is 1.5 billion miles. Winds often flow from the south, southeast and east, so emissions from Kaufman County often contribute to violations other counties. These factors, in conjunction with the VMT and growth rate support the inclusion of Kaufman County in the nonattainment area.

Parker County: Recommended for inclusion by Texas; has 2008 NEI emissions of 9,550 tons of NOx and 11,708 tons of VOC; there are 130 people per square mile; has a 2010 population of 116,927 with a growth rate of 15.4 percent between 2000 and 2010; total VMT is 1.3 billion miles. The comparatively high emissions and population growth rates indicate that Parker County should be included in the nonattainment area. In addition, at times back trajectories indicate that emissions from Parker County contribute to observed violations in the area. These factors support the inclusion of Parker County in the nonattainment area.

Rockwall County: Recommended for inclusion by Texas; has 2008 NEI emissions of 1,859 tons of NOx and 2,047 tons of VOC; there are 530 people per square mile; has a 2010 population of 78,337 with a

growth rate of 25.7 percent between 2000 and 2010; total VMT is 676 million miles. While a small county, its population density and emissions support the inclusion of Rockwall County in the nonattainment area.

Tarrant County: Recommended for inclusion by Texas and has a violating monitor, so will be included.

Wise County: Has 2008 NEI emissions of 11,911 tons of NOx and 17,609 tons of VOC; there are 60 people per square mile; has a 2010 population of 59,127 with a growth rate of 5.9 percent between 2000 and 2010; total VMT is 969 million. The close proximity of these comparatively high emissions to violating monitors indicates that this county should be included in the nonattainment area. The high growth in these emissions is due in large part to growth in emissions from Barnett Shale gas production development, but also due to growth in population. Examination of back trajectories indicates that at times emissions from Wise County contribute to observed violations in the area and also to observed violations that have helped set the DFW area DV in the past. Source apportionment modeling for a portion of an ozone season indicates that emissions from Wise County can contribute to observed violations in the DFW nonattainment area. These factors support the inclusion of Wise County in the nonattainment area.

McLennan and Navarro counties do not have violating monitors, and Freestone, Limestone, McLennan, Navarro and Robertson counties are not nearby a county with a violating monitor. Freestone, Limestone, McLennan, Navarro and Robertson counties have significant levels of emissions of NOx and VOC and thus have the potential to contribute to monitored violations, but are not in or nearby counties with a violating monitor. McLennan County has a population greater than 60,000 and a population density greater than 100 people per square mile; and Freestone and McLennan counties have experienced population growth of at least 10 percent, indicating the potential to contribute to violations, but are not in or nearby counties with a violating monitor. Freestone, Limestone, McLennan, Navarro and Robertson counties have a small fraction of residents that work in the counties with violating monitors, which suggests that at this time there is little, if any integration with the urban core counties. Finally, Freestone, Limestone, McLennan, Navarro and Robertson counties are outside of the DFW CSA, and all but Navarro County are outside of the MPO boundary.

Our evaluation of data for Freestone, Limestone, McLennan, Navarro and Robertson Counties does not support a nonattainment designation for the 2008 ozone standard at this time. We do not believe these five counties are contributing to violations of the 2008 ozone standard in a nearby area.

Our evaluation of data for Cooke, Delta, Fannin, Grayson, Henderson, Hunt and Somervell Counties does not support a nonattainment designation. We did not receive any comments that these counties should be included in the DFW nonattainment area.

ATTACHMENTS

Appendix 1. Accessing Worker Data from http://onthemap.ces.census.gov/.

Figure 2. Dallas-Fort Worth Ozone and Ozone Precursor Monitoring Network, with Population Density.

Figure 3. Population Density Change Percentage Between 2000 and 2010 Census for Dallas-Fort Worth Ozone and Ozone Precursor Monitoring Network.

Figure 4. Overlay of 24-hour HYSPLIT back trajectories of all 75 ppb exceedances at the Keller monitor for the 2008-2010 period.

Figure 5a. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Eagle Mtn. Lake Exceedances (2006-10) (zoom view).

Figure 5b. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Parker County Exceedances (2006-10).

Figure 5c. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Parker County Exceedances (2006-10) (zoom view).

Appendix 1. Accessing Worker Data from http://onthemap.ces.census.gov/.

1. Open your internet browser to <u>http://onthemap.ces.census.gov/</u>.

2. Click on "Text-Only" in the upper right corner.

3. In the open search box, type the name of the county for which you seek information. Click on "Counties" in the drop-down box for "Search All Names" and then click the "Go" button. The search results will appear on your screen and click on the appropriate county, even if you are offered only one choice.

4. Analysis settings will appear next on your screen. To gather our worker data, under the Home/Work Area, we clicked on "Home." Under the Analysis Type, we clicked on "Destination" and then under "Options for Destination: Destination Type" we used the drop-down box and clicked on "Counties." We clicked on 2010 for the year, and "All Jobs" for the Job Type. Then scroll down to the bottom of the page and click the "Run Analysis" button.

5. The Work Destination Analysis will appear next on your screen. The default setting will show you the top 10 counties where workers are employed. To show additional counties, click on "Top 25" and then click the "Update" button.

6. To run analyses for additional counties, scroll to the top of the screen and click on "Return to search."



Figure 2. Dallas-Fort Worth Ozone and Ozone Precursor Monitoring Network, with Population Density

Figure 3. Population Density Change Percentage Between 2000 and 2010 Census for Dallas-Fort Worth Ozone and Ozone Precursor Monitoring Network







Figure 5a. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Eagle Mtn. Lake Exceedances (2006-10) (zoom view).









Figure 5c. NOAA HYSPLIT MODEL 24-Hour Back Trajectory Parker County Exceedances (2006-10) (zoom view).