

APPENDIX G

**REASONABLY AVAILABLE CONTROL MEASURES
ANALYSIS**

2015-014-SIP-NR

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1. INTRODUCTION

Under the 2008 eight-hour ozone National Ambient Air Quality Standard (NAAQS), the Dallas-Fort Worth 2008 eight-hour ozone nonattainment area (DFW area), consisting of Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, Tarrant, and Wise Counties, is classified as a moderate nonattainment area with a July 20, 2018 attainment deadline (80 FR 12264, March 6, 2015). Nonattainment areas classified as moderate and above are required to meet the mandates of the Federal Clean Air Act (FCAA) under §§172(c)(1), 182(b)(2), and 182(f). FCAA, §172(c)(1) requires states to provide for implementation of all reasonably available control measures (RACM) as expeditiously as practicable and to include RACM analyses in the state implementation plan (SIP). In the general preamble for implementation of the FCAA Amendments published in the April 16, 1992 issue of the *Federal Register* (57 FR 13498), the United States Environmental Protection Agency (EPA) explains that it interprets FCAA, §172(c)(1) as a requirement that states incorporate into their SIP all RACM that would advance a region's attainment date; however, states are obligated to adopt only those measures that are reasonably available for implementation in light of local circumstances. In the general preamble, the EPA provided guidelines to help states determine which measures should be considered reasonably available:

If it can be shown that one or more measures are unreasonable because emissions from the sources affected are insignificant (i.e. de minimis), those measures may be excluded from further consideration... the resulting available control measures should then be evaluated for reasonableness, considering their technological feasibility and the cost of control in the area to which the SIP applies... In the case of public sector sources and control measures, this evaluation should consider the impact of the reasonableness of the measures on the municipal or other government entity that must bear the responsibility for their implementation.

On July 2, 2002, the United States (U.S.) Court of Appeals upheld the EPA's definition of RACM, including the consideration of economic and technological feasibility, ability to cause substantial widespread and long-term adverse impacts, collective ability of the measures to advance a region's attainment date, and whether an intensive or costly effort will be required to implement the measures.

2. CONTROL STRATEGY DEVELOPMENT PROCESS

2.1. Stationary Sources

The Texas Commission on Environmental Quality (TCEQ) used a two-step process to develop the list of potential stationary source control strategies evaluated during the RACM analysis for the DFW Attainment Demonstration (AD) SIP for the 2008 eight-hour ozone NAAQS submitted to the EPA on July 10, 2015. The same list was used for this DFW AD SIP revision. First, the TCEQ compiled a list of potential control strategy concepts based on an initial evaluation of the existing control strategies in the DFW area and existing sources of volatile organic compounds (VOC) and nitrogen oxides (NO_x) in the DFW area. The EPA allows states the option to consider control measures outside the ozone nonattainment area that can be shown to advance attainment; however, consideration of these sources is not a requirement of the FCAA. A draft list of potential control strategy concepts was developed from this initial evaluation. The TCEQ also invited stakeholders to suggest any additional strategies that might help advance attainment of the DFW area. The final list of potential control strategy concepts for RACM analysis includes the strategies on the initial draft list and the strategies suggested by stakeholders during the informal stakeholder comment process. Table G-1: *DFW Area*

Stationary Source RACM Analysis presents the final list of potential control measures for stationary sources as well as the RACM determination for each measure.

2.2. On-Road and Non-Road Mobile Sources

The control strategy development process to identify potential control strategies for RACM analysis of on-road and non-road mobile sources was similar to the process used for the stationary sources. Table G-2: *DFW Area On-Road and Non-Road Mobile Sources RACM Analysis* presents the final list of potential control measures for on-road and non-road mobile sources as well as the RACM determination for each measure.

3. RACM EVALUATION APPROACH

Each control measure identified through the control strategy development process was evaluated to determine if the measure would meet established criteria to be considered reasonably available. The TCEQ used the general criteria specified by the EPA in the proposed approval of the New Jersey RACM analysis published in the January 16, 2009 issue of the *Federal Register* (74 FR 2945):

RACM is defined by the EPA as any potential control measure for application to point, area, on-road and non-road emission source categories that meets the following criteria:

- *The control measure is technologically feasible.*
- *The control measure is economically feasible.*
- *The control measure does not cause “substantial widespread and long-term adverse impacts.”*
- *The control measure is not “absurd, unenforceable, or impracticable.”*
- *The control measure can advance the attainment date by at least one year.*

The EPA did not provide guidance in the *Federal Register* notice on how to interpret the criteria “advance the attainment date by at least one year.” Considering the July 20, 2018 attainment date for this attainment demonstration, the TCEQ evaluated this aspect of RACM based on advancing the deadline for implementing control measures by one year, to July 20, 2017.

In order for a control measure to “advance attainment,” it would need to be implemented prior to the beginning of ozone season in the attainment year, so suggested control measures that could not be implemented by March 1, 2017 could not be considered RACM because the measures would not advance attainment. To “advance the attainment date by at least one year” to July 20, 2017, suggested control measures would have to be fully implemented by March 1, 2016. In order to provide a reasonable amount of time to fully implement a control measure, the following must be considered: availability and acquisition of materials; the permitting process; installation time; availability of testing; and time needed for testing.

At the time the initial RACM analysis for the DFW 2008 eight-hour ozone nonattainment area was conducted, the EPA set a December 31, 2018 attainment deadline for the 2008 eight-hour ozone NAAQS (77 FR 30088). However, this attainment date was vacated by the United States District of Columbia Circuit (D.C. Circuit Court) in its ruling on a lawsuit filed against the EPA. The EPA subsequently issued *Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; Final Rule* (2008 ozone standard SIP requirements rule) (80 FR 12264, March 6, 2015) which included modification of 40 Code of Federal Regulations (CFR) §51.1103 consistent with the D.C. Circuit Court decision to establish attainment dates that run from the effective date of designation, i.e., July 20, 2012,

rather than the end of the 2012 calendar year. The RACM analysis and determination for this DFW AD SIP revision is therefore based on the July 20, 2018 attainment deadline.

The TCEQ also considered whether the control measure was similar or identical to control measures already in place in the DFW area. If the suggested control measure would not provide substantive and quantifiable benefit over the existing control measure, then the suggested control measure was not considered RACM because reasonable controls were already in place.

4. STATIONARY SOURCE RACM DETERMINATION AND DISCUSSION

4.1. General Discussion

Based on the RACM analysis, the TCEQ determined that no potential control measures met the criteria to be considered RACM. All potential control measures evaluated for stationary sources were determined to not be RACM due to technological or economic feasibility, enforceability, adverse impacts, or ability of the measure to advance attainment of the NAAQS. In general, the inability to advance attainment is the primary determining factor in the RACM analyses. As discussed in Chapter 3: *Photochemical Modeling* and Chapter 5: *Weight of Evidence* of this SIP revision, the current modeling results indicate that the DFW area will demonstrate attainment. Modeling results based on the April 2007 EPA modeling guidance project the future ozone design value to be 77 parts per billion (ppb). Use of the newer EPA draft guidance projects this 2017 future ozone design value to be 76 ppb. These 2017 design values and the weight of evidence analysis included in Chapter 5 of this SIP revision demonstrate attainment of the 2008 eight-hour ozone NAAQS. Based on a July 20, 2018 attainment deadline, and a 2017 attainment year, a control measure would have to be in place prior to the beginning of ozone season in the attainment year to be considered RACM, or March 1, 2017. Furthermore, a control measure would have to be in place by March 1, 2016 in order for the measure to advance the attainment deadline by one year. The TCEQ's evaluation of the potential control measures indicates that it is not possible to reasonably implement any control measures that would advance attainment of the NAAQS. The complete list of stationary source potential control measures and additional details on the specific RACM determinations for each control measure are included in Table G-1.

4.1.1. Wise County

On October 31, 2011, the state recommended a nonattainment designation for the nine-county DFW area, consisting of Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant Counties. Wise County was not included in the DFW nonattainment area recommendation, and was recommended to be designated attainment/unclassifiable. The EPA sent a letter to the governor on December 9, 2011 responding to the state's recommendations for area designations under the 2008 eight-hour ozone NAAQS. In that letter, the EPA indicated that it intended to modify the state's recommended DFW nonattainment area designation to include Hood and Wise Counties. The EPA stated that Wise County should be designated nonattainment because of its proximity to violating monitors, growth in emissions from Barnett Shale gas production, a wind pattern that indicates emissions could at times impact violating monitors, and growth in population.

On February 29, 2012, the governor responded to the EPA, requesting that it not designate Hood and Wise Counties nonattainment for the 2008 eight-hour ozone NAAQS. The governor's letter included the TCEQ's technical analysis support documentation¹, demonstrating that there

¹ TCEQ. *Technical Analysis Support Documentation by the Texas Commission on Environmental Quality (TCEQ) Regarding U.S. Environmental Protection Agency (EPA) Responses to State and Tribal 2008 Ozone Designation Recommendations*. Enclosed in letter from Rick Perry to EPA Region 6 dated February 29, 2012.

was insufficient scientific justification for the EPA's proposed modification of the state's recommendation.

Although Wise County is located near some regulatory ozone monitors that measure nonattainment and the most recent census data indicate that there has been some population growth in Wise County, emissions are substantially lower than those cited by the EPA and the TCEQ's back trajectory analysis showed that few wind trajectories would impact violating monitors. Furthermore, Wise County does not have a federal regulatory ozone monitor and is primarily a rural county with a low population density. The TCEQ's analysis concluded that the contributions from Wise County to the DFW ozone monitors are relatively small. The contributions are less than 1 ppb, which indicates that the majority of the design value comes from the DFW area and other areas of the modeling domain. Therefore, reductions from sources in Wise County would not advance attainment of the 2008 ozone NAAQS, so no potential control measures for those sources met the criteria to be considered RACM. In its final nonattainment area designation, the EPA decided to include Wise County in the DFW area, but excluded Hood County.

For the DFW AD SIP revision submitted to the EPA on July 10, 2015, the TCEQ adopted concurrent rulemaking to implement FCAA VOC and NO_x reasonably available control technology (RACT) requirements for Wise County (Rule Project Numbers 2013-048-115-AI and 2013-049-117-AI). These control measures were not adopted for RACM purposes. Additional detail on these rulemakings can be found in Chapter 4: *Control Strategies and Required Elements* and in Appendix F: *Reasonably Available Control Technology Analysis* of the 2015 DFW AD SIP revision.

4.2. NO_x RACM Analysis

Additional NO_x control measures will not advance attainment of the 2008 eight-hour ozone NAAQS in the DFW area because it is not possible to implement any significant and cost effective control measure early enough to advance attainment. For this reason and for the other reasons identified in this section and in Table G-1 of this appendix, no NO_x control measures are included as RACM for this SIP revision.

The TCEQ has already implemented stringent and innovative regulations to address NO_x emissions from stationary sources within the nine-county DFW serious nonattainment area for the 1997 eight-hour ozone NAAQS. The existing rules in Title 30 Texas Administrative Code (TAC) Chapter 117 include the Emission Specifications for Eight-Hour Attainment Demonstration (ESAD) located in §117.410, §117.1310, and §117.2110 for major sources, major source electric generating units (EGU), and minor source engines, respectively. These ESADs were adopted to not only satisfy major source RACT requirements for the DFW 1997 eight-hour ozone nonattainment area, but to also advance attainment of the 1997 eight-hour ozone NAAQS. In many cases, the level of control required by the ESADs is more stringent than the RACT-only requirement. For many of these source categories, additional control beyond the current ESAD level is not feasible. Additionally, Chapter 117, Subchapter E, Division 2, Cement Kilns, includes emission specifications and control requirements for the cement kilns located in Ellis County.

Analysis of the 2011 point source emissions inventory (EI) for the nine-county DFW area indicates that the top 15 source categories in the DFW area represent over 98% of the point source NO_x emissions in the area. These source categories include: cement kilns (29.9%), internal combustion engines (26.4%), EGU turbines (14.5%), non-cement kilns (5.0%), furnaces (4.2%), boilers (4.0%), EGU boilers (3.6%), heaters (2.0%), turbines (1.8%), internal combustion engines for electricity generation (1.5%), incinerators (1.3%), jet engine test cells

(1.0%), thermal oxidizers (1.0%), dryers (1.0%), and ovens (0.8%). The existing Chapter 117 rules include emission specifications for all but two of these source categories. States are preempted from regulating jet engine test cells per FCAA, §233. Some stationary engines used for electricity generation are subject to the current Chapter 117 rules depending on the facility where the engine is located. Stationary reciprocating internal combustion engines located at electric generating utility sites subject to Chapter 117, Subchapter C are exempt. However, the NO_x emissions from this particular subcategory of engines are not significant and in many cases are emergency generators. The total emissions from the internal combustion engine electric generation category are less than 0.5 tpd.

4.2.1. Cement Kilns

The cement kilns located in Ellis County emit 29.9% of the NO_x from point sources in the nine-county DFW area and approximately 2% of the total DFW NO_x emissions. These kilns are subject to the requirements of Chapter 117, Subchapter E, Division 2. Three companies currently operate four kilns in Ellis County. These kilns have been operating well under their ozone season NO_x source cap due to low product demand and replacement of higher-emitting wet kilns with dry kilns. No additional rulemaking would be needed to realize these reductions.

Martin Marietta [formerly Texas Industries, Inc. (TXI)] currently operates one dry preheater/precalciner (PH/PC) kiln. This kiln has emitted an average of 1.57 pounds of NO_x per ton of clinker (lb NO_x/ton of clinker) from 2001 through 2014. The kiln is relatively fuel efficient and intrinsically low in NO_x emissions due to its design and the chemistry of the feed materials. Because of relatively low NO_x in the offgas, expected NO_x removal efficiency for selective noncatalytic reduction (SNCR) or selective catalytic reduction (SCR) are lower for this kiln.

Ash Grove Cement Company (Ash Grove) operated three kilns in Ellis County. However, a 2013 consent decree with the EPA required by September 10, 2014 shutdown of two kilns and reconstruction of kiln #3 with SNCR with an emission limit of 1.5 lb NO_x/ton of clinker and a 12-month rolling tonnage limit for NO_x of 975 tpy. The reconstructed kiln is a dry kiln with year-round SNCR operation. Emissions from this kiln in 2014 averaged 1.3 lb NO_x/ton of clinker.

Holcim U.S., Inc. (Holcim) currently has two dry PH/PC kilns equipped with SNCR. During the 2009 and 2011 ozone seasons, Holcim ran both kilns with SNCR at reduced output below 1.5 lb NO_x/ton of clinker. In the 2012 ozone season, Holcim ran one kiln with SNCR and reported less than 1.5 lb NO_x/ton of clinker.

All sites in Ellis County with dry kilns have demonstrated at least one ozone season of operating below 1.5 lb NO_x/ton of clinker, compared with the 1.7 lb NO_x/ton of clinker in the source cap formula. Although the source cap emission specification in §117.3123 could be altered to allow for modeling of these NO_x reductions, the estimated 4.6 tons per day (tpd) reduction of the source cap is unlikely to result in significant real NO_x reductions beyond current operation, and will therefore not advance attainment.

Some stakeholders recommended installation of SCR, either as a standalone technology or as part of a hybrid SCR-SNCR system, for these cement kilns. The 2006 TCEQ cement kiln study, *Assessment of NO_x Emissions Reduction Strategies for Cement Kilns – Ellis County*, cited numerous potential issues associated with the use of SCR at cement plants, including: catalyst deactivation due to catalyst poisoning; catalyst plugging and fouling due to high dust loading and deposits; reduction in NO_x control efficiency due to high sulfur levels; temperature related factors leading to lower NO_x removal efficiencies; NO_x concentration variability and ammonia slip; and undesirable by-product formation in the SCR system causing adverse effects on

downstream equipment. Furthermore, in its 2010 Portland Cement New Source Performance Standard (NSPS) preamble (75 FR 54994 - 54995), the EPA stated “we did not believe that SCR was sufficiently demonstrated technology for [the cement] industry.” The EPA cited concerns with dust loading on the catalyst rendering it less effective, and raw material variation between kilns as reasons for rejecting SCR as a viable control requirement for all new cement kilns.

The use of hybrid SCR-SNCR has not been demonstrated at any U.S. cement plant. SCR systems have been installed at some European cement plants and recently at a Lafarge North America, Inc. long dry cement kiln in Joppa, Illinois. The full-scale SCR test at the Lafarge Joppa Kiln No. 1 is the result of an EPA consent decree². On September 10, 2015, the EPA and the State of Illinois approved the SCR Final Demonstration Report for Kiln 1 at the Lafarge Joppa facility. The Lafarge Joppa Kiln 1 must now comply with a 30-day rolling average emission limit of 3.21 lb NO_x/ton of clinker. The publically available version of the report has been released by the EPA. The report does not include detailed design information, total cost numbers, or operational data, so it is insufficient for evaluating the feasibility of applying the technology to the Ellis County cement kilns or to establish an emission limit for the purposes of this attainment demonstration. Based on the information currently available, the TCEQ does not consider SCR or hybrid SCR-SNCR systems on the Ellis County Portland cement kilns to be adequately demonstrated with regard to technological or economic feasibility. Further, there is insufficient time to design, permit, construct, and commission an SCR system prior to the March 1, 2017 RACM deadline. For these reasons, SCR or hybrid SCR-SNCR are not RACM for the existing Ellis County cement kilns.

4.2.2. Engines

Stationary engines in the nine-county DFW area are subject to the requirements of Chapter 117, Subchapter B, Division 4, for major sources or Chapter 117, Subchapter D, Division 2 for minor sources. The TCEQ has already implemented RACM for stationary, gas-fired, reciprocating internal combustion engines at major and minor industrial, commercial, and institutional sources. Chapter 117 provides NO_x emission specifications for stationary reciprocating internal combustion engines. Gas-fired engines fired on landfill gas are limited to 0.60 grams per horsepower-hour (g/hp-hr). All other gas-fired engines are limited to 0.50 g/hp-hr except for lean-burn engines placed into service before June 1, 2007 that have not been modified, reconstructed, or relocated on or after June 1, 2007, which are limited to 0.70 g/hp-hr. Additional NO_x control on stationary gas-fired engines beyond the current requirements is neither technologically nor economically feasible.

The TCEQ has also implemented RACM for stationary diesel and dual-fuel engines in the nine-county DFW area. Stationary, dual-fuel, reciprocating internal combustion engines at major sources are limited to 0.50 g/hp-hr. Stationary diesel reciprocating internal combustion engines at major sources placed into service before March 1, 2009 and that have not been modified, reconstructed, or relocated on or after March 1, 2009 are limited to the lower of 11.0 g/hp-hr or the emission rate established by testing, monitoring, manufacturer’s guarantee, or manufacturer’s other data. NO_x emission specifications for stationary diesel engines installed, modified, reconstructed, or relocated on or after March 1, 2009 are tiered based on engine horsepower. Furthermore, in order to qualify for exemption, low-use and emergency stationary diesel engines installed, modified, reconstructed, or relocated on or after June 1, 2007 at major

² Consent decree: Lafarge North America, Inc., Lafarge Midwest, Inc., and Lafarge Building Materials, Inc. Issued January 21, 2010.

and minor sources must meet the corresponding emission standard for non-road engines in 40 Code of Federal Regulations §89.112(a), Table 1 (October 23, 1998).

The TCEQ considered establishing more stringent NO_x emission specifications for stationary diesel engines with high annual operating hours. However, only four stationary diesel engines with annual operating hours greater than 1000 hours were identified in the point source EI and the NO_x emissions from these engines are only 0.1 tpd. No major source diesel engines were identified in Wise County. The area source EI includes a total of 4.0 tpd NO_x for all industrial, commercial, and institutional diesel fuel combustion, but the portion attributable to stationary diesel engines with high annual operating hours is not quantifiable. It was therefore determined that this control measure will not advance attainment.

The TCEQ also considered establishing controls for portable engines, such as portable generators, and other engines considered non-stationary due to temporary service. However, the potential reduction benefit of this control measure is not quantifiable based on available information.

Stakeholders suggested that the TCEQ require electrification of all oil and gas industry compressors in the DFW area over 100 hp. This control measure would require replacement of some or all of the engines powering natural gas compressors with electric motors. While there would be a reduction of NO_x at the compressor location, several other factors make the strategy infeasible as RACM. Under Texas Health and Safety Code (THSC), §382.017(f) the TCEQ may not specify: (1) a particular method to be used to control or abate air pollution; (2) the type, design, or method of installation of equipment to be used to control or abate air pollution; or (3) the type, design, method of installation, or type of construction of a manufacturing process or other kind of equipment. Therefore, the TCEQ cannot require electrification of compressors as the stakeholders suggest, because that would involve requirement of a particular method to control or abate air pollution.

The proposed strategy requires replacing the engine with an electric motor. A motor controller is potentially also required. It may also be necessary to replace some compressors if a compatible electric motor is not available. Electric motors large enough to run larger compressors would need three phase electric service line upgrades at most, if not all, sites, some of which are far from electricity distribution lines. Depending on the electricity demands of the motor and local electricity transmission lines, a transformer may be necessary to adjust supply voltage. Increased electricity demand would require increased generation at existing EGUs with associated increases in NO_x emissions. If sufficient EGU capacity is not available, several new baseload EGUs would need to be constructed, which cannot occur before the required compliance date. Even if all of these equipment hurdles are overcome, since the DFW area currently has low NO_x emission specifications, the incremental NO_x reduction would be reduced and the price per ton of NO_x removed would be prohibitively large. Given these factors, the strategy is both economically infeasible and unable to be implemented quickly enough to advance attainment.

4.2.3. Utility Electric Generation in the DFW Area

Major source EGUs in the nine-county DFW area are subject to the requirements of Chapter 117, Subchapter C, Division 4. The TCEQ considered potential NO_x emissions reductions by establishing more stringent emission specifications, revoking exemptions, or establishing source or system caps. Fifteen units could be affected: seven gas-fired turbines, and eight gas-fired utility boilers. More stringent emission specifications could require the installation of SNCR or SCR. Assuming that all SNCR applications could achieve a 30% reduction in NO_x emissions and

that all SCR applications could achieve an 80% reduction, this translates to potential reductions of approximately 1.11 tpd or 2.97 tpd, respectively. These relatively small reductions will not advance attainment because the installation, operation, and testing of SNCR or SCR may not be fully implemented in time to advance attainment.

4.2.4. Industrial, Commercial, and Institutional Boilers

Major source boilers in the nine-county DFW area are already subject to the requirements of Chapter 117, Subchapter B, Division 4. The emission standards for gas-fired boilers are: 0.036 pounds per million British thermal unit (lb/MMBtu) for boilers less than 40 million British thermal units per hour (MMBtu/hr); 0.030 lb/MMBtu for boilers equal to or greater than 40 MMBtu/hr but less than 100 MMBtu/hr; and 0.020 lb/MMBtu for boilers equal to or greater than 100 MMBtu/hr. The emission standard for liquid fuel-fired boilers is 2.0 pounds per 1,000 gallons of fuel. Additional control beyond the current ESAD levels for boilers at major sources will not advance attainment. The ESADs do not include an emission specification for wood-fired boilers. One wood-fired boiler was identified in Kaufman County, and it is already equipped with SCR. A NO_x emission specification for wood-fired boilers was adopted as part of the DFW NO_x RACT rulemaking (Rule Project Number 2013-049-117-AI) for RACT purposes. Because this boiler is already equipped with SCR, additional controls will not advance attainment.

During the 2007 DFW attainment demonstration for the 1997 eight-hour ozone NAAQS, the TCEQ considered requiring NO_x retrofit controls on minor source industrial, commercial, and institutional boilers in the DFW area. However, the TCEQ determined that insufficient time was available to implement minor source boiler NO_x controls as a retrofit strategy in the DFW area due to the numerous minor sources potentially subject to the requirements. For the purposes of this RACM analysis for the 2008 eight-hour ozone NAAQS, the time allowed for implementation of a minor source boiler retrofit approach is still insufficient for the measure to be considered as RACM. The TCEQ considered establishing NO_x emission specifications for replacement boilers rated greater than 2.0 MMBtu/hr at minor sources. The potential emission reductions from replacement or modified boilers through 2018 are expected to be insignificant and will not advance attainment in the time provided due to the relatively long life-span and low turn-over rate of boilers in this service. According to the Texas Department of Licensing and Regulation's boiler registration database, the average age of industrial, commercial, and institutional boilers at minor sources in the DFW area is approximately 20 years.

4.3. VOC RACM Analysis

Due to the abundance of naturally occurring biogenic VOC emissions, the DFW area is primarily NO_x-limited with respect to ozone formation. Under these conditions, additional VOC reductions are much less effective than NO_x reductions at lowering ozone levels, so implementation of additional anthropogenic VOC measures will not advance attainment of the 2008 eight-hour ozone NAAQS in the DFW area. The modeling and monitoring analyses discussed in Appendix C: *Photochemical Modeling for the DFW Attainment Demonstration SIP Revision for the 2008 Eight-Hour Ozone Standard* and Appendix D: *Conceptual Modeling for the DFW Attainment Demonstration SIP Revision* of this SIP revision contain more detail about the NO_x-limited nature of ozone formation within DFW. For this reason and for the other reasons identified in Table G-1 of this appendix, no VOC control measures are included as RACM for this SIP revision.

4.4. Analysis of Control Measures Outside of the DFW Area

The EPA allows states the option to consider control measures outside the ozone nonattainment area that can be shown to advance attainment. Modeling results based on the April 2007 EPA modeling guidance project the future ozone design value to be 77 ppb. Use of the newer EPA

draft guidance projects this 2017 future ozone design value to be 76 ppb. These 2017 design values and the weight of evidence analysis included in Chapter 5 of this SIP revision demonstrate attainment of the 2008 eight-hour ozone NAAQS. Because the current modeling results indicate that the DFW area will demonstrate attainment, the TCEQ has determined that no additional control measures for counties outside of the DFW area are justified considering the potential economic impact to these attainment county sources, the limited potential benefit, and the projected 2017 future design values for the DFW area.

The TCEQ has already implemented controls in attainment counties in East and Central Texas to address NO_x emissions and ozone transport from stationary sources outside the DFW area. These include the existing rules in 30 TAC Chapter 117, Subchapter E, Division 1, Utility Electric Generation in East and Central Texas; and Chapter 117, Subchapter E, Division 4, East Texas Combustion. These rules first became effective May 11, 2000 and were included as part of the DFW attainment demonstration for the 1997 eight-hour ozone NAAQS adopted on April 19, 2000 (1999-055-SIP-AI).

4.4.1. Utility Electric Generation in East and Central Texas

Existing Chapter 117, Subchapter E, Division 1 includes NO_x emission specifications for utility electric power boilers and stationary gas turbines that are used to generate electric energy for compensation. The rules apply to units placed into service before December 31, 1995 that are located in Atascosa, Bastrop, Bexar, Brazos, Calhoun, Cherokee, Fannin, Fayette, Freestone, Goliad, Gregg, Grimes, Harrison, Henderson, Hood, Hunt, Lamar, Limestone, Marion, McLennan, Milam, Morris, Nueces, Parker, Red River, Robertson, Rusk, Titus, Travis, Victoria, and Wharton Counties. These rules were adopted as part of the control strategy to reduce overall background levels of ozone in nonattainment areas, including DFW.

The TCEQ considered the potential impact of increasing the stringency of the existing rules. Sixty-nine units could be affected: 18 coal-fired boilers, 19 gas-fired boilers, and 32 gas turbines. More stringent emission specifications could require the installation of SNCR or SCR. Assuming that all SNCR applications could achieve a 30% reduction in NO_x emissions and that all SCR applications could achieve an 80% reduction, this translates to potential reductions of approximately 32.91 tpd and 133.64 tpd, respectively. However, because these sources are located outside of the DFW nonattainment area, the ozone impact in DFW of these potential NO_x reductions is not expected to be sufficient to advance attainment. The potential ozone reduction benefits of the SNCR control level would be significantly less than the SCR control level due to the much lower emission reduction potential. The total capital costs of achieving these controls are estimated to be \$152,877,000 for the SNCR control level and \$7,979,976,640 for the SCR control level. The installation, operation, and testing of SNCR or SCR may not be fully implemented in time to advance attainment. Modeling results based on the April 2007 EPA modeling guidance project the future ozone design value to be 77 ppb. Use of the newer EPA draft guidance projects this 2017 future ozone design value to be 76 ppb. These 2017 design values and the weight of evidence analysis included in Chapter 5 of this SIP revision demonstrate attainment of the 2008 eight-hour ozone NAAQS. Given the substantial costs associated with this control measure, the insufficient time available to implement controls, the limited ozone reduction benefit to the DFW area, and the current modeling results indicating that the DFW area will demonstrate attainment, the TCEQ has determined that imposing additional controls on these attainment county electric generating utilities is not justified.

4.4.2. East Texas Combustion

Existing Chapter 117, Subchapter E, Division 4 requires owners and operators of stationary, gas-fired, reciprocating internal combustion engines, unless exempted, located in specified counties

in East Texas to meet NO_x emission specifications and other requirements in order to reduce NO_x emissions and ozone transport into the DFW nonattainment area. These counties include: Anderson, Brazos, Burleson, Camp, Cass, Cherokee, Franklin, Freestone, Gregg, Grimes, Harrison, Henderson, Hill, Hopkins, Hunt, Lee, Leon, Limestone, Madison, Marion, Morris, Nacogdoches, Navarro, Panola, Rains, Robertson, Rusk, Shelby, Smith, Titus, Upshur, Van Zandt, and Wood Counties.

The TCEQ considered the potential impact of increasing the stringency of the existing East Texas Combustion rules by lowering the current applicability for rich burn engines from 240 horsepower (hp) to 50 hp for requiring the 1.0 gram per horsepower-hour emission limit. While the ozone reduction benefit of lowering the applicability to 50 hp would be somewhat improved over the original control measure benefits, it is still insufficient to advance attainment of the DFW area for the 2008 eight-hour ozone NAAQS. Furthermore, in order to achieve this additional NO_x reduction, substantially more engines would become subject to the rule. Approximately 2,270 more engines could be subject to the control device installation, which is estimated to be four to five times the number of rich burn, gas-fired, engines currently subject to the East Texas Combustion rule. The installation, operation, and testing of SNCR or SCR on this many engines may not be fully implemented in time to advance attainment. Modeling results based on the April 2007 EPA modeling guidance project the future ozone design value to be 77 ppb. Use of the newer EPA draft guidance projects this 2017 future ozone design value to be 76 ppb. These 2017 design values and the weight of evidence analysis included in Chapter 5 of this SIP revision demonstrate attainment of the 2008 eight-hour ozone NAAQS. Given the large number for engines that would need to be controlled under the potential control measure, the time required to achieve compliance, the limited expected ozone reduction benefit to the DFW area, and the current modeling results indicating that the DFW area will demonstrate attainment, the TCEQ has determined that imposing additional controls by lowering the applicability threshold for these attainment county sources is not justified.

5. ON-ROAD AND NON-ROAD MOBILE SOURCE RACM DETERMINATION AND DISCUSSION

5.1. General Discussion

Based on the RACM analysis, the TCEQ determined that no potential on-road or non-road mobile source control measures met the criteria to be considered RACM. All potential control measures evaluated for mobile sources were determined to not be RACM due to technological or economic feasibility, enforceability, adverse impacts, or ability of the measure to advance attainment of the NAAQS. As discussed in Section 4.1 of this appendix, the inability to advance attainment is the primary determining factor in the RACM analyses. Additional control measures are not necessary for the area to demonstrate attainment by the attainment date and it is not possible for the TCEQ to implement any control measures that would provide for earlier attainment of the NAAQS. The complete list of on-road and non-road mobile source potential control measures and the specific details for each RACM determination are included in Table G-2 of this appendix.

5.2. Texas Emissions Reduction Plan (TERP)

The TCEQ understands the desire to use the TERP as a control measure that can be considered in the modeling. However, the TCEQ determined that for this attainment demonstration SIP revision it was more appropriate to consider the TERP as a weight of evidence measure in support of other measures where the emissions reductions can be better defined and modeled. The use of the TERP as a weight of evidence measure is in recognition of several factors: uncertainty in the amount of TERP funding appropriated to the agency from year to year; the fact that the TERP programs are voluntary and participation and effectiveness may vary; and

other factors making it difficult to project emissions reductions to the level of certainty appropriate for including in the SIP commitments and modeling.

Regarding the unobligated balance of money in the TERP Fund, the appropriation amounts are determined by the legislature and, for purposes of the SIP, it is not possible for the TCEQ to guarantee or commit that the appropriations will increase.

Table G-1: DFW Area Stationary Source RACM Analysis

Control Measure	Pollutant	Point or Area Source	RACM	RACM Analysis and Justification
TCEQ Initial Control Strategy Concepts for DFW 10-County Region Controls				
Expand applicable regulations to Wise County.	NO _x and VOC	Area and Point	No	Modeling indicates that the Wise County ozone contribution to the DFW 10-county area's design value is insignificant. Therefore, emission reductions from Wise County will not advance attainment. Concurrent with the DFW AD SIP revision submitted to the EPA on July 10, 2015, the TCEQ adopted rulemaking to implement FCAA NO _x and VOC RACT requirements for Wise County (Rule Project Numbers 2013-048-115-AI and 2013-049-117-AI). These control measures were not adopted for RACM purposes. See Section 4.1.1: <i>Wise County</i> .
Adjust the NO _x emission factor for dry kilns from 1.7 lb NO _x /ton of clinker to 1.5 lb NO _x /ton of clinker in the NO _x emissions cap equation for Ellis County cement kilns.	NO _x	Point	No	Estimated emission reductions will not advance attainment. See Section 4.2.1: <i>Cement Kilns</i> .
Establish more stringent NO _x emission specifications for stationary diesel engines with high annual operating hours.	NO _x	Area and Point	No	Diesel engines in DFW are already subject to existing emission specifications in 30 TAC Chapter 117. Further reductions will not advance attainment.
Establish controls for portable engines, such as portable generators, and other engines considered non-stationary due to temporary service.	NO _x	Area	No	Unknown technological and economic feasibility at this time. Emissions reduction benefit not quantifiable.

Control Measure	Pollutant	Point or Area Source	RACM	RACM Analysis and Justification
Reduce NO _x emissions from utility electric generation sources by establishing more stringent emission specifications, revoking exemptions, or establishing source or system caps.	NO _x	Point	No	There could be 15 affected EGUs in the DFW area: seven gas-fired turbines, and eight gas-fired utility boilers. More stringent emission specifications could require the installation of selective non-catalytic reduction (SNCR) or SCR. Analysis assumes that all SNCR applications would achieve a 30% reduction in NO _x emissions (approximately 1.11 tpd), and that all SCR applications would achieve an 80% reduction (approximately 2.97 tpd). These additional reductions will not advance attainment in the time provided. See Section 4.2.3: <i>Utility Electric Generation in the DFW Area</i> .
Establish NO _x emission specifications for replacement boilers rated greater than 2.0 MMBtu/hr at minor sources.	NO _x	Area	No	The potential emission reductions from replacement or modified boilers through 2018 are expected to be insignificant and will not advance attainment in the time provided. See Section 4.2.4: <i>Industrial, Commercial, and Institutional Boilers</i> .
Establish NO _x emission specifications for any source categories at major sources not included in prior rulemakings (e.g., new unit classes such as wood-fired boilers).	NO _x	Point	No	One wood-fired boiler identified in Kaufman County is already equipped with SCR. A NO _x emission specification for wood-fired boilers was adopted as part of the DFW NO _x RACT rulemaking (Rule Project Number 2013-049-117-AI). Additional controls on this one boiler will not advance attainment.
More stringent major source industrial, commercial, and institutional gas-fired boiler NO _x emission specifications.	NO _x	Point	No	Additional control beyond the current ESAD levels for boilers at major sources will not advance attainment. See Section 4.2.4.
Reduce emissions from volatile organic compounds (VOC) storage tanks by establishing more stringent control requirements, expanding applicability, or eliminating certain storage tank exemptions.	VOC	Point	No	Modeling indicates additional VOC control measures will not advance attainment.

Control Measure	Pollutant	Point or Area Source	RACM	RACM Analysis and Justification
Establish more stringent VOC vent gas control requirements or expand the applicability of the existing rules to include additional sources.	VOC	Area and Point	No	Modeling indicates additional VOC control measures will not advance attainment.
Reduce VOC emissions from bakeries by establishing more stringent control requirements or lowering the threshold for requiring controls.	VOC	Point	No	Modeling indicates additional VOC control measures will not advance attainment.
Require additional VOC controls for industrial wastewater systems; expand the rule applicability to include additional sources; or establish emission control requirements for publicly owned wastewater treatment facilities.	VOC	Area and Point	No	Modeling indicates additional VOC control measures will not advance attainment.
Establish more stringent VOC control requirements for municipal solid waste landfills to all ten counties.	VOC	Area	No	Modeling indicates additional VOC control measures will not advance attainment.
Increase the stringency of the VOC control requirements for loading and unloading operations.	VOC	Point	No	Modeling indicates additional VOC control measures will not advance attainment.
Establish more stringent VOC fugitive emission control requirements in petroleum refining, natural gas processing, and petrochemical processes. Options include: establishing more stringent leak monitoring requirements (similar to highly-reactive volatile organic compounds (HRVOC) monitoring); lowering the detection limits for equipment leaks; or requiring instrument monitoring of connectors for equipment leaks.	VOC	Area	No	Modeling indicates additional VOC control measures will not advance attainment.
Establish VOC content limits and more stringent control requirements for degreasing processes.	VOC	Area	No	Modeling indicates additional VOC control measures will not advance attainment.
Establish more stringent VOC control requirements for solvent-using processes, such as surface coatings and printing.	VOC	Area	No	Modeling indicates additional VOC control measures will not advance attainment.

Control Measure	Pollutant	Point or Area Source	RACM	RACM Analysis and Justification
Establish more stringent VOC control requirements for cutback asphalt.	VOC	Area	No	Modeling indicates additional VOC control measures will not advance attainment.
Establish more stringent VOC control requirements for the degassing or cleaning of stationary and transport vessels or expand existing rules to include all 10 counties in the DFW area.	VOC	Area and Point	No	Modeling indicates additional VOC control measures will not advance attainment.
Establish more stringent VOC controls for upstream oil and gas operations. Options include: installing condensers; controls on glycol dehydrators; replacement of high-bleed pneumatic devices; or fugitive emissions monitoring and leak repair programs.	VOC	Area and Point	No	Modeling indicates additional VOC control measures will not advance attainment.
Reduce VOC emissions from breweries by implementing work practice standards or requiring the use of add-on control devices.	VOC	Point	No	Modeling indicates additional VOC control measures will not advance attainment.
TCEQ Initial Control Strategy Concepts for Transport Controls (Outside DFW)				
Reduce NO _x emissions from East and Central Texas utility electric generation sources by establishing more stringent emission specifications, revoking exemptions, or establishing source or system caps.	NO _x	Area and Point	No	Given the substantial costs associated with this control measure, the limited ozone reduction benefit to the DFW area, and the current modeling results indicating that the DFW area will demonstrate attainment, the TCEQ has determined that imposing additional controls on these attainment county electric generating utilities is not justified. See Section 4.4.1: <i>Utility Electric Generation in East and Central Texas</i> .

Control Measure	Pollutant	Point or Area Source	RACM	RACM Analysis and Justification
Reduce NO _x emissions from stationary gas-fired engines by increasing the stringency of the existing East Texas combustion rules by lowering the current applicability for rich burn engines from 240 horsepower (hp) to 50 hp for requiring the 1.0 gram per horsepower-hour emission limit in the East Texas Combustion area. Approximately 2,270 engines could be subject to the control device installation and 3,030 engines subject to the testing requirement.	NO _x	Area	No	Given the large number of engines that would need to be controlled under the potential control measure, the limited ozone reduction benefit to the DFW area, and the current modeling results indicating that the DFW area will demonstrate attainment, the TCEQ has determined that imposing additional controls by lowering the applicability threshold for these attainment county sources is not justified. See Section 4.4.2: <i>East Texas Combustion</i> .
Extend the control requirements for VOC storage tanks to include sources located within 100 kilometers (km) of the DFW area.	VOC	Area	No	Modeling indicates additional VOC control measures will not advance attainment.
Extend the VOC control requirements for the degassing or cleaning of stationary and transport vessels to include sources located within 100 km of the DFW area.	VOC	Area	No	Modeling indicates additional VOC control measures will not advance attainment.
Establish VOC controls for upstream oil and gas operations located within 100 km of the DFW area. Options include: installing condensers; controls on glycol dehydrators; replacement of high-bleed pneumatic devices; or fugitive emissions monitoring and leak repair programs.	VOC	Area and Point	No	Modeling indicates additional VOC control measures will not advance attainment.
Potential Control Strategy Concepts Suggested by Stakeholders				

Control Measure	Pollutant	Point or Area Source	RACM	RACM Analysis and Justification
Use of de-nitrification (DeNO _x) SCR systems for cement kilns. Use of SCR rather than SNCR or use of hybrid SNCR-SCR systems at cement plants.	NO _x	Point	No	Based on the information currently available, the TCEQ does not consider SCR or hybrid SCR-SNCR systems on the Ellis County Portland cement kilns to be adequately demonstrated with regard to technological or economic feasibility. Further, there is insufficient time to design, permit, construct, and commission an SCR system prior to the March 1, 2017 RACM deadline. See Section 4.2.1.
Include emissions from coal-fired power plants and oil and gas industry in SIP. Take into account drilling activity not only in the Barnett Shale but consider impacts from neighboring regions such as the Permian Basin which can transport pollution to the DFW area. Ensure all emissions from equipment in drilling operations are counted, including: condensate storage tanks, compressor stations, and pneumatic devices.	VOC and NO _x	Area and Point	No	Not a control measure. No quantifiable reduction.
Include temporal and spatial analysis of gas well emissions.	VOC and NO _x	Area and Point	No	Not a control measure. No quantifiable reduction.
Ensure that the most recent numbers are used to calculate emissions from onland drilling rigs and well completions.	VOC and NO _x	Area and Point	No	Not a control measure. No quantifiable reduction.
Install pollution controls such as SCR to reduce pollution by up to 90%, or shut down three East Texas power plants (Big Brown, Martin Lake, and Monticello). Close down coal-fired power plants in East Texas.	NO _x	Area and Point	No	Given the substantial costs associated with this control measure, the limited ozone reduction benefit to the DFW area, and the current modeling results indicating that the DFW area will demonstrate attainment, the TCEQ has determined that imposing additional controls on these attainment county electric generating utilities is not justified. Shutdown of these three power plants would be not economically feasible. See Section 4.4.1.

Control Measure	Pollutant	Point or Area Source	RACM	RACM Analysis and Justification
Require SCR on all existing coal-fired power plants and require that they be used completely on high ozone days. Add SCRs to units already equipped with SNCRs. Partner with EGU owner/operator during high ozone days to use full potential of SCR/SNCR on high ozone days, or over-control during morning hours.	NO _x	Point	No	Given the substantial costs associated with this control measure, the limited ozone reduction benefit to the DFW area, and the current modeling results indicating that the DFW area will demonstrate attainment, the TCEQ has determined that imposing additional controls on these attainment county electric generating utilities is not justified. Local action would be required to mandate voluntary over-control of NO _x on high ozone days. Control beyond existing enforceable emission specifications would require voluntary action. Over-control of existing SCR could also result in adverse impacts associated with ammonia emissions. See Section 4.4.1.
Require SCR for industrial boilers, steel mills, brick kilns, and lime kilns. Add SCRs to units already equipped with SNCRs.	NO _x	Point	No	Boilers, lime kilns, and brick kilns at major sources in the nine-county DFW area are already subject to the requirements of Chapter 117, Subchapter B, Division 4. Additional reductions beyond the current level of control will not advance attainment.
Consider building energy codes and reporting as weight of evidence or RACM. Adopt 2012 International Energy Conservation Code (IECC) as Residential Energy Code and 2012 IECC Commercial Code or American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Standard 90.1–2010 as Commercial Energy Code. Require Seasonal Energy Efficiency Ratio (SEER) 16 for residential and small commercial air conditioners. Require publicly posted building energy labels for all municipal and government institutional buildings.	NO _x	Area and Point	No	Not quantifiable or currently enforceable. See Chapter 5 for discussion on EE/RE projects and their role in the SIP.

Control Measure	Pollutant	Point or Area Source	RACM	RACM Analysis and Justification
Use of shaded parking. Use of alternative paving surfaces for parking lots. Use of solar carports at park and rides, transit stations, parking garages, or malls to help reduce VOC emissions and reduce grid load to be quantified using the EPA's AVERT tool.	VOC and NO _x	Area	No	Not quantifiable. Modeling indicates additional VOC control measures will not advance attainment. See Chapter 5 for discussion on EE/RE projects and their role in the SIP. The EPA's AVERT tool cannot be used to project emissions reductions in future years.
Adjust street lamps in Downtown Fort Worth that stay on an extra 45 minutes. Hotel sensor light installation.	NO _x	Area	No	Not quantifiable. See Chapter 5 for discussion on EE/RE projects and their role in the SIP.
Provide financial incentives to those who choose solar, wind, and geothermal power for their homes.	NO _x	Area	No	Not enforceable. The TCEQ has no authority to provide financial incentives. Legislative action would be required. Any legislative funding for such incentive programs is not permanent; therefore, incentive programs do not meet criteria to be SIP creditable or RACM. Not quantifiable. See Chapter 5 for discussion on EE/RE projects and their role in the SIP.
Do not allow electric resistance heating or electric resistance DHW in residential and commercial buildings where natural gas is available. Encourage installation of ground source heat pumps in residential and small commercial buildings. Encourage installation of electronic ignition in all new and replacement gas-fired appliances. Install fine bubble diffusers in all wastewater treatment facilities. Encourage retro-commissioning of HVAC systems for all existing commercial and institutional buildings. Consider adopting area-wide smart meter demand reduction capabilities (demand response).	NO _x	Area	No	Not quantifiable or enforceable. See Chapter 5 for discussion on EE/RE projects and their role in the SIP.
Mandate electric lawn equipment, specifically leaf blowers and mowers.	NO _x	Area	No	Not a SIP creditable control measure because not quantifiable.

Control Measure	Pollutant	Point or Area Source	RACM	RACM Analysis and Justification
Minimize use of local incinerators at entertainment venues.	NO _x	Area	No	Not a SIP creditable control measure because not quantifiable.
Provide tax incentives for replacing generators or adding controls.	NO _x	Area and Point	No	Not enforceable. The TCEQ has no authority to provide tax incentives. Legislative action would be required. Any legislative funding for such incentive programs is not permanent; therefore, incentive programs do not meet criteria to be SIP creditable or RACM. Not quantifiable.
Use more compressed natural gas in the state (point sources).	NO _x	Point	No	Not a SIP creditable control measure because not quantifiable.
Electrification of all gas compressors in DFW nonattainment area and all of East Texas upwind sources.	NO _x	Area and Point	No	The replacement of all engines powering natural gas compressors with electric motors in DFW and East Texas is not economically feasible and cannot be implemented in time to advance attainment. See Section 4.2.2: <i>Engines</i> .
Limit emissions from fracking in DFW and the Permian Basin.	VOC and NO _x	Area and Point	No	Drilling activity is under the jurisdiction of the Texas Railroad Commission.
Only allow closed loop systems for natural gas drilling, and allow only electric pump station facilities. Require shale gas drilling companies to recycle fracking water from at least one or two additional wells to decrease the number of tanker trips.	VOC and NO _x	Area and Point	No	Drilling activity is under the jurisdiction of the Texas Railroad Commission.
Local offset policies for oil and gas facilities currently exempt from FCAA offset regulations.	VOC and NO _x	Area and Point	No	Would require local action to mandate.

Control Measure	Pollutant	Point or Area Source	RACM	RACM Analysis and Justification
Install vapor recovery equipment for gas wells. Use improved leak detection technology in oil and gas industry. Switch to low-bleed or no-bleed pneumatic controllers. Better maintenance of compressor stations in oil and gas industry. Require green completion technology on all existing and new wells. Require periodic emissions testing for wells in Barnett Shale.	VOC	Area	No	Modeling indicates additional VOC control measures will not advance attainment. The EPA's NSPS for the oil and gas sector limits VOC emissions from emission sources including: well completions, pneumatic controllers, equipment leaks from natural gas processing plants, sweetening units at natural gas processing plants, reciprocating compressors, centrifugal compressors and storage vessels which are constructed, modified or reconstructed after August 23, 2011.
Assess and model recent Colorado air quality regulations.	VOC	Area	No	Modeling indicates additional VOC control measures will not advance attainment.
100% mitigation of trees taken during land development. Use of buffalo grass and other native plants. Texas SmartScape program to ensure promotion of plant species that are drought-tolerant and low VOC. Work with urban foresters to develop a recommended list of low VOC species. Regional landscaping of plants and trees with highly reactive biogenic VOC emissions.	VOC	Area	No	Modeling indicates additional VOC control measures will not advance attainment.
Limit VOCs in paint and other consumer products.	VOC	Area	No	Modeling indicates additional VOC control measures will not advance attainment.
Control dust from road construction sites. Limit fireplace use and installation of fireplaces in new development.	PM	Area	No	Will not advance attainment of the ozone standard. Particulate Matter (PM) is not a precursor of ozone.

Control Measure	Pollutant	Point or Area Source	RACM	RACM Analysis and Justification
Encourage the installation of water conserving appliances and landscape water systems in all residential and commercial buildings. Encourage the installation and use of rainwater collection and distribution systems in residential buildings. Encourage accelerated maintenance of municipal water and wastewater systems to reduce water leakage and wastewater in-flow.	N/A	Area	No	Will not advance attainment of the ozone standard.
Consider how to retrofit existing system for better technology, or retrofit business to adopt changing technology.	N/A	N/A	No	Not a SIP creditable control measure because not quantifiable.
Better understanding of the value of time.	N/A	N/A	No	Not a SIP creditable control measure because not quantifiable.
Quit suing the EPA.	N/A	N/A	No	Not a SIP creditable control measure because not quantifiable.
Consider the price of new technology to users might be too high.	N/A	N/A	No	Not a SIP creditable control measure because not quantifiable.
Other innovative funding sources.	N/A	N/A	No	Not a SIP creditable control measure because not quantifiable.
Decline in birth rates, changes in demographics.	N/A	N/A	No	Not a SIP creditable control measure because not quantifiable.
Evaluate technology assumptions that are not consistent. Look in the models to better consistency. Assumptions not connected to models.	N/A	N/A	No	Not a SIP creditable control measure because not quantifiable.

Table G-2: DFW Area Mobile Sources RACM Analysis

Control Measure Description	Pollutant	On-Road or Non-Road	RACM	RACM Analysis
TCEQ Initial Control Strategy Concepts for DFW 10-County Region Controls				
Airports use Ultra Low Emitting Vehicles or electric vehicles instead of diesel for ground transportation	NO _x and VOC	On-Road	No	Measure is being voluntarily implemented through memorandums of agreement in the region.
California diesel fuel	NO _x	On-Road	No	Texas Low Emission Diesel is an enforceable rule under Texas' SIP and is similar to California diesel fuel.
Accelerated vehicle retirement program	NO _x and VOC	On-Road	No	The Drive a Clean Machine Program is currently available in the DFW ozone nonattainment area. Reductions will not advance attainment.
Deny registration to vehicles with repeated emission failures	NO _x and VOC	On-Road	No	The TCEQ's Vehicle Registration Denial program does not allow motorists to register vehicles in ozone nonattainment areas if the vehicle failed an emissions test and has not passed a retest during the last 12 months.
Statewide emissions testing	NO _x and VOC	On-Road	No	Would require local action and/or legislative action to implement.
Centralized IM-240 test with repairs done separately	NO _x and VOC	On-Road	No	Texas utilizes Onboard Diagnostic testing which is more effective than IM-240 testing. No new NO _x benefit.
Idling reduction	NO _x	On-Road	No	Local action would be required to mandate.
Use liquefied natural gas and compressed natural engines for locomotives	NO _x	Non-Road	No	Locomotive engine standards already exist in federal regulations.
SCR for locomotives	NO _x	Non-Road	No	Locomotive engine standards already exist in federal regulations.
Texas Emissions Reduction Plan (TERP)	NO _x	On-Road and Non-Road	No	TERP has been implemented and continues to provide financial incentives to eligible individuals, businesses, or local governments to reduce emissions from polluting vehicles and equipment.

Control Measure Description	Pollutant	On-Road or Non-Road	RACM	RACM Analysis
Potential Control Strategy Concepts Suggested by Stakeholders				
Expedite use of alternative fuels for airplanes. Use pre-conditioned air from terminals rather than run airplane engines while on tarmac. Encourage single engine taxi for airplanes.	NO _x and VOC	Non-Road	No	Local and federal action required to implement.
Convert aircraft ground support equipment to electric.	NO _x and VOC	On-Road	No	Measure is being voluntarily implemented through memorandums of agreement in the region.
Agencies following Energy Policy Act (EPACT) and enforcement of EPACT mandates. Support the Department of Energy's (DOE) Workplace Electric Vehicle (EV) Charging Initiative. Expand the workday to add flexibility and decrease congestion on roadway. Promote four-day work week. Payroll direct deposit. Mandatory telecommuting during high ozone days. Possibility of telecommute by type of work. Incentives for employees to stay inside during lunch. Commute Counselor is a person to work with individuals to help them find alternative commute options and educates them on alternatives to single occupancy vehicle driving.	NO _x and VOC	On-Road	No	Local action required to mandate.
Alternative fuel vehicle education. Zero car households by choice, fewer cars in households. Detailed knowledge about special use vehicles. More information from health community; obesity in transportation. Eco-driving to use your vehicle more efficiently.	NO _x and VOC	On-Road	No	Not a SIP creditable control measure because not quantifiable.

Control Measure Description	Pollutant	On-Road or Non-Road	RACM	RACM Analysis
<p>Electric vehicles and battery environmental impacts. Vehicle efficiencies will allow more capacity; technology in automobile, increase in capacity. Technology cause and effects with Smart Cars vs. “dumb” cars. Impacts of electric vehicles and other alternative fuels on the environment. Vehicle-to-vehicle and vehicle-to-infrastructure connectivity; information technology (IT) connected vehicles and autonomous vehicles provide safety opportunities. Vehicle aerodynamic improvements (from original equipment manufacturer (OEM) or add-ons). Automated or autonomous vehicles & technology to optimize overall system. Strategically placed pods of unmanned aircraft to take photos of accident scenes.</p>	NO _x and VOC	On-Road	No	Technology is not readily available and is cost prohibitive.
<p>Encourage additional EV sales through various means (dealership partnership/education, get more people to experience them through rental cars/taxis/limos/hotel shuttles, use EV owner groups to help at outreach events.</p>	NO _x and VOC	On-Road	No	Not a SIP creditable control measure because not quantifiable.
<p>Develop high-powered wireless charging solutions for electric vehicles including transit and shuttle buses fleet vehicles streetcars, and off-road industrial vehicles.</p>	NO _x and VOC	On-Road and Non-Road	No	Technology is not readily available and is cost prohibitive.
<p>Encourage multi-tenant dwellings to add EV infrastructure to properties.</p>	NO _x and VOC	On-Road	No	Not a SIP creditable control measure because not quantifiable.
<p>Mandate or shift to zero emission vehicles. Only low emitting vehicles for high congested areas. Implement new or strengthen current laws, regulations, and incentives to require public transit, school buses, and delivery vehicles be powered by alternative fuels. Require fork lifts to go to electric.</p>	NO _x and VOC	On-Road and Non-Road	No	Local and federal action required to implement.

Control Measure Description	Pollutant	On-Road or Non-Road	RACM	RACM Analysis
Require Tier 3 or higher construction equipment on all Regional Transportation Commission (RTC)-funded transportation projects (better yet, all public sector construction).	NO _x and VOC	On-Road	No	Local action required to implement.
Delivery methods in local distribution; coordination of distribution centers. Reduce demand for animal-based products. Offshoring jobs come back to the U.S.; intermodal logistics see the trade-off of labor cost and trip cost. Amazon partnered with the United Parcel Service (UPS) to deliver seven days a week. Drone package delivery by Amazon. Promote purchasing of locally grown food and manufactured goods. Additional freight due to purchasing online. U.S. Postal Service (USPS) - no delivery on Saturday; accounting for these reduced trips. Electronic cash payment. Online purchasing. Increase in home-based business; stimulate home-based business. Economics of demand management. Freight moving off peak/night.	NO _x and VOC	On-Road	No	Not quantifiable/not enforceable.
Truck delivery windows. Specific parking spaces or areas for truck deliveries during certain daytime hours. Inland port coordination to deliver goods; use of or changes in technology to make movement of goods more efficient.	NO _x and VOC	On-Road and Non-Road	No	Not quantifiable/not enforceable.
Electrified concrete for roadways to charge electric vehicles.	NO _x and VOC	On-Road	No	Technology is not readily available and is cost prohibitive.
Family activities, soccer, extracurricular activities not considered in earlier models. Predicting effects of the economy on travel model.	NO _x and VOC		No	Not a SIP creditable control measure because not quantifiable.

Control Measure Description	Pollutant	On-Road or Non-Road	RACM	RACM Analysis
<p>Use of technology in reading newspaper; mobile changing way of life. Rental car usage. Review vehicle sizing, capacity, and users. Less than 25 year-olds driving less. Remote voting. Empty nesters moving to urban areas. Social interaction; use of social media to socialize, dating, etc. Online education. Older people working longer. Changes in trips due to older generation volunteering. Having longer commutes changes travel behavior. College graduates moving back to parents' house. Social security in future - work longer; younger generations might not retire as early. Flexible schedule on-line education; real estate market trend shifts. What is driving us to leave the house; investigate on motivations to leave the house and make a trip. More people are eating out more. Shift in population location to fringes and high income to central business district (CBD). High emitting vehicles traveling far. Public involvement online. Presence of better technology for remote access (Skype); tele-presence for meetings; Google for meetings. Physical presence in conferences, computer may make cable TV go away; technology in future to have mega conference remotely. Print at home or 3D printing.</p>	NO _x and VOC	On-Road	No	Not quantifiable/not enforceable.
<p>Research the effects of Daylight Savings Time on emissions and commute patterns.</p>	NO _x and VOC	On-Road	No	Not quantifiable/not enforceable.
<p>Car Free Day.</p>	NO _x and VOC	On-Road	No	Not quantifiable/not enforceable.
<p>Remote meter reading.</p>	NO _x and VOC	On-Road	No	Local action required to mandate.

Control Measure Description	Pollutant	On-Road or Non-Road	RACM	RACM Analysis
Construction with pre-cast concrete, faster.	NO _x and VOC	Non-Road	No	Not quantifiable/not enforceable.
Increasing/introducing parking pricing.	NO _x and VOC	On-Road		Local action required to mandate.
Allow EVs and other alternative fuel vehicles to use high occupancy vehicle (HOV) lanes, regardless of number of occupants. Offer incentives to use managed lanes with environmentally friendly cars; zip car incentives & HOV or managed lanes. Remove passenger minimum requirements for HOV lanes for alternative fuel vehicles. Increase enforcement of single riders using HOV. Use both available HOV lanes on Interstate Highway (IH) 30 near Fairpark. Allow single occupancy vehicles (SOV) to use HOV lanes on ozone days	NO _x and VOC	On-Road	No	Local action required to mandate.
Propane lawnmowers for golf courses. Metro lawn propane conversions. Create enforceable policies for restriction of polluting lawn equipment. Lawn and garden equipment exchange programs.	NO _x and VOC	Non-Road	No	Local action and federal action required to mandate.
Create enforceable policies for restriction of motorcycles and older boat motors two-stroke.	NO _x and VOC	On-Road and Non-Road	No	Local action and federal action required to mandate.
Less kids in school buses; more drop-off at schools due to lack of buses, lack of safety when walking. Movement to bicycling or car share; bicycle, car rental and vehicle ownership; ubiquitous. Mode share shift between cars and bikes. Include level of service for bikes. School Pools/School Walks - group of kids carpool or walk to school together. Implement a regional bikeshare system.	NO _x and VOC	On-Road	No	Not quantifiable/not enforceable. Local action required to mandate.

Control Measure Description	Pollutant	On-Road or Non-Road	RACM	RACM Analysis
Rideshare with mobile app technologies. Car sharing effect for congestion rent or not.	NO _x and VOC	On-Road	No	Not quantifiable/not enforceable. Local action required to mandate.
Increase public perception of the system and social responsibility. Hesitation to use transit due to crime. Bullet trains and hyper-loops. Increase inter-city bus travel. Level of Service for Transit. Build an overhead light rail system ("L") similar to northeastern U.S. Increase incentives and outreach by Dallas Area Rapid Transit (DART), Fort Worth Transportation Authority (The T) and Trinity Railway Express (TRE) to increase ridership (e.g., discount days, education about safety of public transit ,etc.). Make weekly passes available for those with the Senior Pass (not just monthly). Make the TRE available on Sundays. Implement the nonstop run between Dallas and Fort Worth as early as possible in 2014. Build a park and ride (PNR) at location of old Big Town Mall, access express bus to downtown service from this point.	NO _x and VOC	On-Road	No	Local action required to mandate.
Help making older cars more reliable to make the performance of the system better (safety and pollution).	NO _x and VOC	On-Road	No	The Drive a Clean Machine Program is available in the DFW area. Reductions do not advance attainment.
Enforce emission testing requirements, increase penalty for driving without proper documentation.	NO _x and VOC	On-Road	No	Local action required to mandate.
Mandatory inspection of all heavy-duty on- and off-road diesel vehicles.	NO _x and VOC	On-Road and Non-Road	No	Inspection of vehicles would not directly result in an air quality benefit. Any emissions benefit resulting from improved adherence to standards would be difficult to quantify. Additionally, Texas does not have the authority to enforce emission standards on interstate traffic.

Control Measure Description	Pollutant	On-Road or Non-Road	RACM	RACM Analysis
No heavy-duty vehicle during ozone days.	NO _x and VOC	On-Road and Non-Road	No	Local action required to mandate.
Establish possible regional equipment "pool" to share smaller fleet of low-emitting equipment- enables retirement of superfluous high-emitting equipment.	NO _x and VOC	On-Road and Non-Road	No	Local action required to mandate.
No drive-thrus (banking, fast food, pharmacy, etc.). Ban idling of all vehicles at schools and daycares. Anti-idling public service announcement (PSA) video that could be used by other organizations. Require shutting off vehicles in drive-thru establishments. Install more truck electrification plug-in stations to reduce idling.	NO _x and VOC	On-Road	No	Local action required to mandate.
Alternative zoning requirements. Education of higher income communities for denser development; education in communities who are fairly high income and to understand development and make smart decisions. Consolidation of stores as they are dwindling. Make a large effort to educate mayors of all cities about the short and long term impacts of continuing "business as usual". Making self-contained communities; better planning for where people live. Economic incentives for district development; effects of local government codes or downtown plans how they may change trips. Mixed-use and transit development. Making self-contained communities; better planning for where people live.	NO _x and VOC	On-Road	No	Local action required to mandate.

Control Measure Description	Pollutant	On-Road or Non-Road	RACM	RACM Analysis
<p>Redefinition of Level of Service. All intersections above specific vehicle miles traveled (VMT) threshold require dedicated right turn lanes. Impacts from yellow flashing arrows for left-hand turn lanes. Roundabouts for safety benefits. UPS right turn policy. Use of dynamic signs to regulate speed. Electronic speed limit signs. Time of day changes in congestion; congestion changes to high urban density areas. Increase funding for signalization and add on-site visits to ensure improvements are operating the way intended. Increase use of dual, signal controlled left turn lanes and dedicated right turn lanes in heavy traffic areas. Increase overpasses over railroads.</p>	NO _x and VOC	On-Road	No	Local action required to mandate.
<p>Use of cell phone data to track commuting patterns. Real time traffic info on phone to help make appropriate commuting decisions; Efficiently travel using Apps when using transit and the supply system. Effects of data on paths and vehicle technology to optimize system; global positioning system (GPS) timing or routing inaccuracies due to delay-congestion non-recurring. Better toll tag readers and technology.</p>	NO _x and VOC	On-Road	No	Local action required to mandate.
<p>Training more regional teams to clear traffic incident. Heavy Duty Wrecker Contracts - contracts with the tow truck companies with a required response time for major incidents and hazardous material (HAZMAT) incidents.</p>	NO _x and VOC	On-Road	No	Local action required to mandate.
<p>Account for more distracted drivers due to telephones. Apps to block use during driving; use of technology to minimize distracting.</p>	NO _x and VOC	On-Road	No	Not quantifiable/not enforceable.

Control Measure Description	Pollutant	On-Road or Non-Road	RACM	RACM Analysis
Build more roads. Fund each mode in accordance with its trip share. If transit carries 2% of the trips then that's all the funding it gets: 2% not 30% or more. Put in truck-only roads.	NO _x and VOC	On-Road and Non-Road	No	Local action required to mandate.
Add more monitors for black carbon and greenhouse gases (GHG) along major highways.	NO _x and VOC	On-Road and Non-Road	No	This SIP concerns the control of ground-level ozone levels. GHGs and black carbon are not precursors of ozone. Therefore this measure is not applicable to the SIP revision.
Mileage based penalizing of trips. Pay as you drive (PAYD) insurance; distance based automobile insurance. Pay for the part of the transportation system that you use; transportation as utility.	NO _x and VOC	On-Road	No	Not quantifiable/not enforceable.
Reduce monitoring usage requirements of TERP grants. Full appropriations of TERP for locomotives.	NO _x and VOC	Non-Road	No	Legislative action required to mandate.
Include the impact of TERP funding likely to accrue in 2014 and 2015 in the ten-county area. Assess the impact of \$991 million TERP balance with significant percentage spent in DFW. Request and spend a significant amount of TERP money in DFW.	NO _x	On-Road and Non-Road	No	Legislative action required to mandate.