February 11, 2015

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Richard A. Hyde, P.E., Executive Director
Steve Hagle, P.E., Deputy Director, Office of Air
David Brymer, Division Director
Kathy Singleton, SIP Project Manager, Air Quality Division
Texas Commission on Environmental Quality
Office of the Chief Clerk (MC-105)
P.O. Box 13087
Austin, Texas 78711-3087

Re: Commission Approval for Proposed Dallas-Fort Worth (DFW) 2008 Eight-Hour Ozone Nonattainment Area Attainment Demonstration (AD) State Implementation Plan (SIP) Revision, SIP Project No. 2013-015-SIP-NR

Dear Ms. Bohac, Ms. Singleton, Mr. Hyde, Mr. Hagle, and Mr. Brymer,

The Downwinders at Risk and Sierra Club submit these comments on Texas's Proposed Dallas-Fort Worth 2008 Eight-Hour Ozone Nonattainment Area Demonstration ("AD") State Implementation Plan ("SIP") Revision, SIP Project No. 2013-015-SIP-NR. We appreciate the work of TCEQ staff and the engagement of TCEQ with other stakeholders in crafting the Proposed Rule. The Proposed Rule, however, is based on an inadequate modeling demonstration that relies upon erroneous, unsupportable, and outdated assumptions, fails to comprehensively and consistently account for emissions from outside the Dallas—Fort Worth area that may raise ozone levels and that can be cost-effectively controlled, and ignores the U.S. Environmental Protection Agency's most recent modeling guidance. As a result, the Proposed AD significantly underestimates likely future design values for ozone and fails to properly evaluate the emissions

reductions necessary to demonstrate attainment. In particular, the proposed rule fails to adequately assess readily-available control technology that is highly cost-effective, favoring controls that are actually far inferior to reasonably available control technology in place throughout the Nation. Indeed, for the single largest point sources of NOx in the state—coal-fired electric generating units and cement kilns—TCEQ declined to implement *any* additional control technology

I. Background

A. Texas's Long History of Ozone Nonattainment in the Dallas-Fort Worth Area

For decades, Texas has struggled to attain federal National Ambient Air Quality Standards ("NAAQS") for ozone pollution, which are designed to protect human health and welfare. For more than forty years—throughout the implementation of the most recent 2008 ozone standard to the first 8-hour standard in 1997, and further back to the 1-hour standard, and then further back still to photochemical oxidant standards in the early 1970's—the Dallas-Fort Worth ("DFW") area has consistently failed to meet maximum ozone air quality standards designed to protect human health and welfare.[1] Although a number of federal, state and local programs have helped reduce levels of ozone precursors emissions in and around Dallas-Fort Worth, the area has air quality monitors that regularly reflect exceedances of federal standards.

Indeed, DFW residents are consistently exposed to some of the highest ozone levels in the central United States. Ozone levels in DFW exceed EPA's 1997 and 2008 ozone standards, and far exceed the maximum limits that current scientific research dictates are necessary to protect human health, and especially sensitive populations such as children, asthmatics, and the elderly. Currently, approximately 52% of Texans—over 14 million people—live in areas with air that has been classified by EPA as unsafe to breathe.[2] This number could rise once EPA corrects the ozone NAAQS in 2015 to reflect the most recent understanding of the medical evidence, under which EPA has proposed a range below the current standard.[3]

B. Ground-Level Ozone Is Dangerous to Human Health

Texas's failing air quality has serious health consequences for Texans, particularly those in and around the Dallas-Fort Worth area where the ozone levels are highest. In the Dallas-Fort

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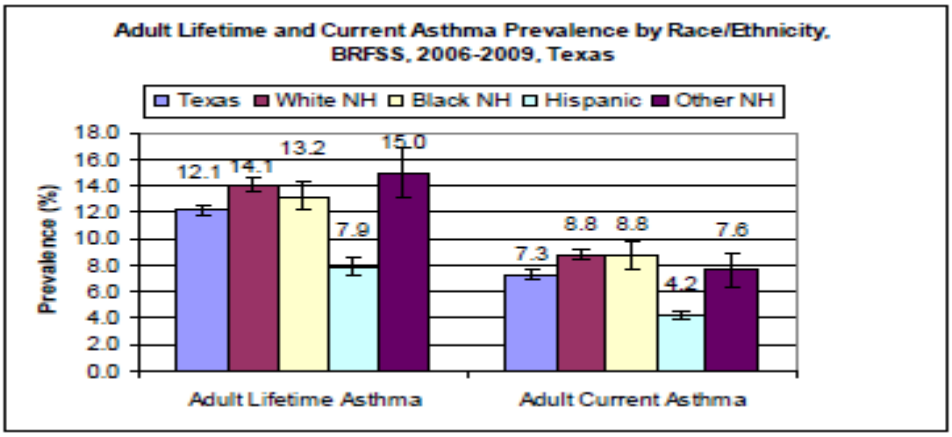
[1] See DFW AD SIP at 1-1 to 1-6. On February 10, 2015, the U.S. Environmental Protection Agency ("EPA") proposed to reclassify the Dallas-Fort Worth area ("DFW") as being in "severe nonattainment" of the original 1997 8-hour ozone standard of 84 parts per billion. *See* http://yosemite.epa.gov/opa/admpress.nsf/0/8b7bd47210a982d785257de80059af6b?OpenDocument. The DFW area has never been in attainment for any NAAQS established by EPA. The agency's proposed "bump up" to severe nonattainment comes five years after the state failed to timely comply with the 1997 standard.

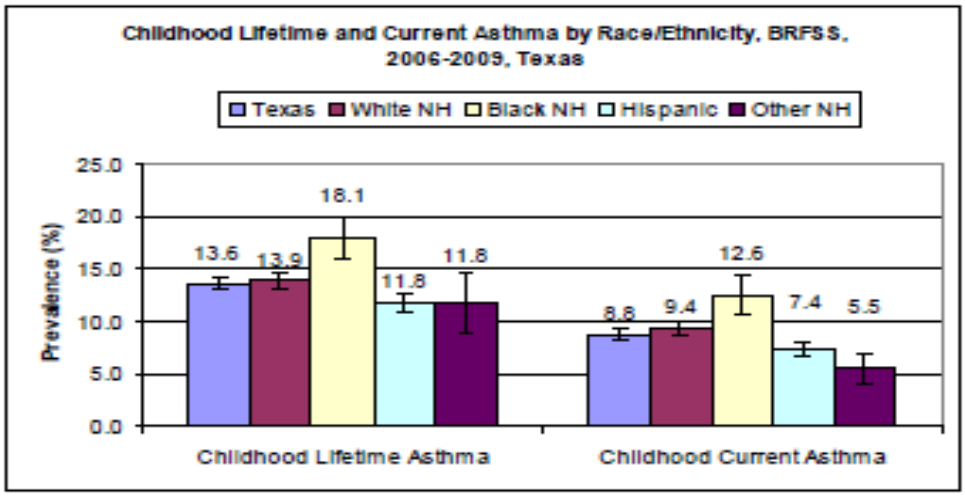
[2] *Compare* EPA's Greenbook, *available at* http://www.epa.gov/oaqps001/greenbk/ancl.html (listing Texas counties in nonattainement for 1997 and 2008 ozone standards), with Texas Dep't of State Health Servs., Texas Population 2014, available at https://www.dshs.state.tx.us/chs/popdat/ST2014.shtm (providing county-by-county population data).

[3] 79 Fed. Reg. 75234 (Dec. 17, 2014).

Worth area, lifetime asthma prevalence in adults and is approximately 12.1%, with minorities and low-income households bearing a disproportionate burden.[4]



Alarmingly, more than 13% of Texas children under the age of 18 will have asthma over the course of their childhood, and nearly 9% of children currently have asthma.[5] In 2013, an estimated 7.3% of adults and 9.1% of children had asthma. This means that more than 1.4 million adults and 617,000 children had asthma.[6]



As the figures above indicate, children, the elderly, minorities, and low income households are especially sensitive to ozone, and often bear a disproportionate asthma burden.

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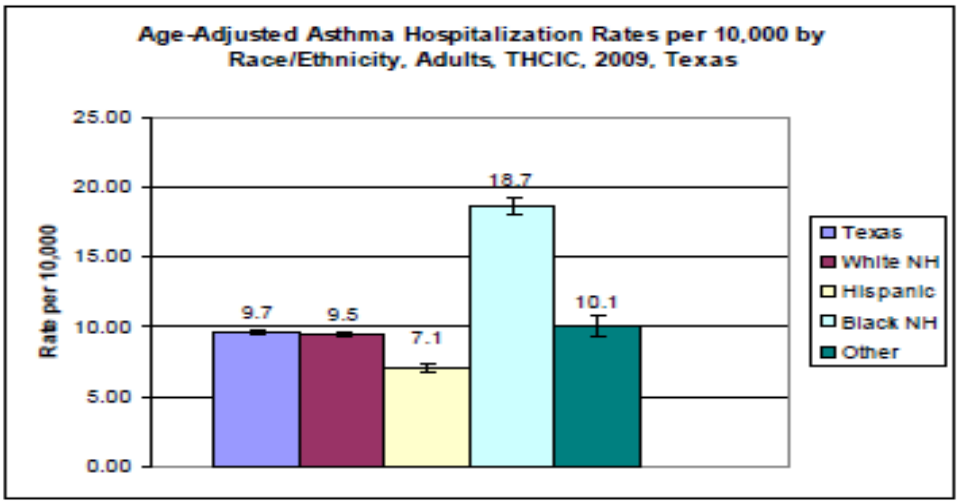
[4] Texas Dep't of State Health Services, 2010 Texas Asthma Burden Report, https://www.dshs.state.tx.us/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=8589994855.

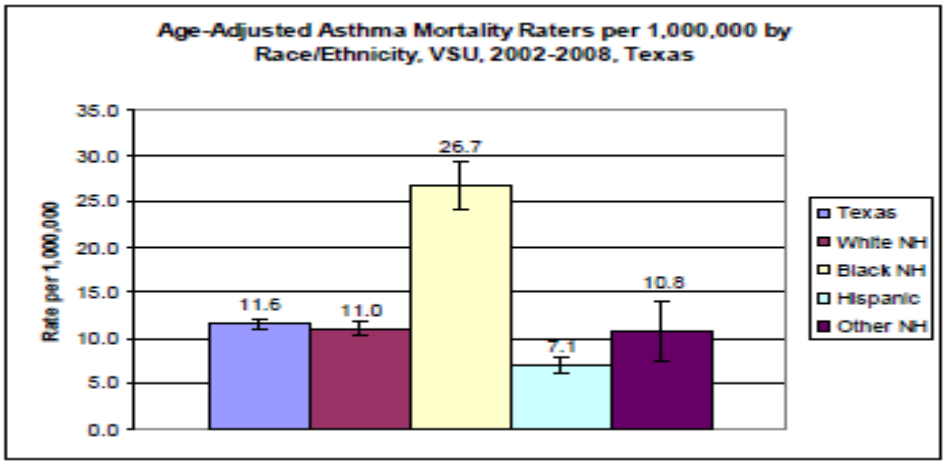
[5] Center for Disease Control, National Center for Environmental Health, Asthma in Texas, http://www.cdc.gov/asthma/stateprofiles/asthma_in_tx.pdf; Texas Dep't of State Health Services, 2010 Texas Asthma Burden Report, https://www.dshs.state.tx.us/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=8589994855.

[6] Texas Dep't of State Health Services, 2014 Texas Asthma Burden Report, https://www.dshs.state.tx.us/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=8589994855.

Non-Hispanic blacks have the highest asthma hospitalization rates out of any group in Texas—double the rate of non-Hispanic whites. Moreover, black Texans are twice as likely as white Texans to visit the emergency department for asthma.



Black Texans are nearly 2.5 times more likely to die from asthma than white Texans.



Ozone is a significant driver of Texas's unhealthful air. Scientific research continues to strengthen our understanding of the harm that ozone causes to public health. Ozone exposure has significant health impacts, particularly for the respiratory system. Severe health impacts are experienced from both singular high levels of exposure and repeated exposures over time. Negative health impacts of both short-term and long-term ozone exposure have been repeatedly

demonstrated through numerous human exposure, epidemiologic, and toxicological studies.[7] These include demonstrated respiratory and cardiovascular morbidity, premature mortality, and perinatal and reproductive impacts, along with other suggested impacts such as to the central nervous system. The physiological impacts of ozone exposure are experienced even by healthy individuals and even at relatively low concentrations of ozone. Certain sensitive groups and individuals, however, are found to have significantly greater susceptibility to ozone-related health impacts. Moreover, while the impacts of acute ozone exposure are better understood, there is a growing body of scientific evidence showing that repeated exposure over time causes additional health impacts which may even be more severe and less reversible.

Exposure to ozone, both short-term (acute) and repeat (chronic) exposure, is well understood to cause or exacerbate respiratory impacts such as breathing discomfort (e.g., coughing, wheezing, shortness of breath, pain upon inspiration), decreasing lung function and capacity, and lung inflammation and injury. Research on the relationship between ozone exposure and respiratory effects is well documented, and indeed EPA's Integrated Science Assessment (ISA) supporting the forthcoming revision of the ozone NAAQS conclusively determined that ozone is responsible for adverse respiratory effects.

Epidemiologic studies have demonstrated consistently that increasing concentrations of ozone are associated with lung function decrements, increases in respiratory symptoms, pulmonary inflammation in children with asthma, increases in respiratory-related hospital admissions and emergency department visits; and increases in respiratory mortality. New multi-city and single-city studies reinforce evidence on ozone-associated respiratory hospital admissions and emergency department visits.[8]

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[7] See U.S. Environmental Protection Agency (2013). Integrated Science Assessment for Ozone and Related Photochemical Oxidants (Final Report) EPA/600/R-10/076F, 2013, *available at* http://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=247492 [hereinafter, ISA (2013)].

[8] Katsouyanni et al. (2009). Air pollution and health: A European and North American approach (APHENA) (Research Report 142); Boston, MA: Health Effects Institute; Cakmak et al. (2006) Respiratory health effects of air pollution gases: Modification by education and income; Arch Environ Occup Health 61: 5-10, http://dx.doi.org/10.3200/AEOH.61.1.5-10; Dales et al. ,(2006), Gaseous air pollutants and hospitalization for respiratory disease in the neonatal period. Environ Health Perspect 114: 1751-1754, http://dx.doi.org/10.1289/ehp.9044; Lin et al. (2008a); Ambient ozone concentration and hospital admissions due to childhood respiratory diseases in New York State, 1991-2001, Environ Res 108: 42-47, http://dx.doi.org/10.1016/j.envres.2008.06.007; Silverman and Ito. (2010); Age-related association of fine particles and ozone with severe acute asthma in New York City, J Allergy Clin Immunol 125: 367-373, http://dx.doi.org/10.1016/j.envres.2008.06.007; Strickland et al. (2010). Short-term associations between ambient air pollutants and pediatric asthma emergency department visits. Am J Respir Crit Care Med 182: 307-316, http://dx.doi.org/10.1164/rccm.200908-1201OC; Strickland et al. (2011). Implications of different approaches for characterizing ambient air pollutant concentrations within the urban airshed for time-series studies and health benefits analyses. Environ Health Global Access Sci Source 10: 36, http://dx.doi.org/10.1186/1476-069X-10-36; Mar and Koenig (2009). Relationship between visits to emergency departments for asthma and ozone exposure in greater Seattle, Washington. Ann Allergy Asthma Immunol 103: 474-479. http://dx.doi.org/10.1016/S1081-1206(10)60263-3; Medina-Ramon et al. (2006). The effect of ozone and PM10 on hospital admissions for pneumonia and chronic obstructive pulmonary disease: A national multicity study. Am J Epidemiol 163: 579-588. http://dx.doi.org/10.1093/aje/kwj078; Ji et al. (2011). Meta-analysis of the Association

Acute ozone exposure is statistically shown to be associated with declining lung function.[9] Respiratory responses to acute ozone exposure include decreased breathing capacity, rapid and shallow breathing, and painful inhalation. Such changes in lung function are reported following exposure to even relatively low ambient ozone concentrations, particularly in sensitive groups such as children and outdoor workers. Studies examining lung function decrements following outdoor activity have shown robust associations for ozone concentrations as low as 60 ppb.[10]

Ozone exposure has been linked to not only the exacerbation of asthma, but also to asthma induction and new development of the disease. For individuals already diagnosed with asthma, evidence shows that ozone exposure increases the likelihood of having an asthma attack.[11] Ozone exposure has been shown to have especially significant effects on asthma exacerbation among children. Children living in areas with higher ambient ozone concentrations have been shown to be more likely to either have asthma or to experience asthma attacks compared with children living in areas having lower ambient ozone concentrations.[12]

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between Short-Term Exposure to Ambient Ozone and Respiratory Hospital Admissions. Environ Res Lett. Apr;6(2). http://www.ncbi.nlm.nih.gov/pubmed/21779304; Tolbert et al. (2007). Multipollutant modeling issues in a study of ambient air quality and emergency department visits in Atlanta. J Expo Sci Environ Epidemiol 17: S29- S35. http://dx.doi.org/10.1038/sj.jes.7500625; Darrow et al. (2011a). The use of alternative pollutant metrics in time-series studies of ambient air pollution and respiratory emergency department visits. J Expo Sci Environ Epidemiol 21: 10-19. http://dx.doi.org/10.1038/jes.2009.49; Stieb (2009). Air pollution and emergency department visits for cardiac and respiratory conditions: A multi-city time-series analysis. Environ Health Global Access Sci Source 8: 25. http://dx.doi.org/10.1186/1476-069X-8-25; Villeneuve et al. (2007). Outdoor air pollution and emergency department visits for asthma among children and adults: A case-crossover study in northern Alberta, Canada. Environ Health Global Access Sci Source 6: 40. http://dx.doi.org/10.1186/1476-069X-6-40; Ito et al. (2007). Characterization of PM2.5, gaseous pollutants, and meteorological interactions in the context of time-series health effects models. J Expo Sci Environ Epidemiol 17: S45-S60. http://dx.doi.org/10.1038/sj.jes.7500627.

[9] *See generally* ISA (2013) sec. 6.2.1.

[10] Brunekreef et al (1994). Respiratory effects of low-level photochemical air pollution in amateur cyclists. Am J Respir Crit Care Med 150: 962-966; Spektor et al (1988). Effects of ambient ozone on respiratory function in active, normal children. Am Rev Respir Dis 137: 313-320, http://www.ncbi.nlm.nih.gov/pubmed/3341625; Ulmer, C. et al. (1997). Effects of ambient ozone exposures during the spring and summer of 1994 on pulmonary function of schoolchildren. Pediatr Pulmonol 23: 344- 353, http://dx.doi.org/10.1002/(SICI)1099-0496(199705)23:5<344::AID-PPUL6>3.0.CO;2-K.

[11] See, e.g., Franze et al. (2005). Protein nitration by polluted air, Enviro Sci Technol. 39: 1673-1678, http://dx.doi.org/10.1021/es0488737; .U.S. Environmental Protection Agency (2006). Air quality criteria for ozone and related photochemical oxidants [EPA Report]. (EPA/600/R-05/004AF). Research Triangle Park, NC, http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=149923.

[12] Akinbami (2010). The association between childhood asthma prevalence and monitored air pollutants in metropolitan areas, United States, 2001-2004. Environ Res. Apr;110(3):294-301, http://dx.doi.org/10.1016/j.envres.2010.01.001.

Evidence also shows positive associations between long-term exposures to ozone and new-onset asthma. For adults, studies showing increased risks for developing asthma per 10 ppb increase in annual mean ozone or 8-hour average.[13]

Ozone exposure is most often linked to adverse respiratory effects, but is also associated with adverse cardiovascular effects through an increasing body of research. Ozone exposures are shown to increase risks of hospitalization for acute myocardial infarction, coronary atherosclerosis, stroke, and heart disease, even at ambient ozone levels well-below current NAAQS.[14] New research also shows that chronic ozone exposure may put children at risk for cardiovascular disease later in life.[15]

Acute and chronic exposure to ozone are linked to premature mortality. Epidemiological and toxicological studies show a strong relationship between short-term ozone exposures and premature mortality.[16] The ISA describes how numerous studies across the U.S., Canada, and Europe—including multi-city, multi-continent, and single city studies—demonstrate positive links between ambient ozone concentrations and respiratory-related mortality. On the whole, ozone-induced premature mortality in these studies found to occur at mean 8-hour maximum concentrations of less than 63 ppb.[17] One important study examining 98 U.S. cities with mean long-term concentrations of 26.8 ppb found associations between ozone level and mortality. Across communities, a 10 ppb increase in the prior week's ozone level was associated with a 0.52% increase in mortality. Higher effect estimates were associated with factors such as race and socioeconomic status (e.g., including unemployment, public transportation use, and owning an air conditioner). In a 14-year study of 95 U.S. cities, links were found between short-term increases in ozone and premature mortality, even when excluding days exceeding 60 ppb, finding that that "daily changes in ambient O3 exposure are linked to premature mortality, even at very low pollution levels."[18]

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[13] McDonnell et al. (1999). Long-term ambient ozone concentration and the incidence of asthma in nonsmoking adults: the Ahsmog study. Environ Res 80: 110-121, http://www.ncbi.nlm.nih.gov/pubmed/10092402; Greer et al. (1993). Asthma related to occupational and ambient air pollutants in nonsmokers. J Occup Environ Med 35: 909-915, http://www.ncbi.nlm.nih.gov/pubmed/8229343.

[14] See ISA (2013) at 6-196 - 6-201.

[15] Breton et al. (2012). Childhood air pollutant exposure and carotid artery intima-media thickness in young adults. Circulation.126:1614-1620, http://www.ncbi.nlm.nih.gov/pubmed/22896588; Adar (2012). Childhood exposures to ozone: the fast track to cardiovascular disease?, Circulation. Sep 25;126(13):1570-2, http://www.ncbi.nlm.nih.gov/pubmed/23008468.

[16] *See generally* ISA (2013) and U.S. Environmental Protection Agency (2013), Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards, Second External Review Draft [hereinafter, Policy Assessment (2014)]. Both conclude that there is a likely causal relationship between short-term ozone increases and total mortality.

[17] ISA (2013) at 2-22.

[18] Bell et al. (2006), The Exposure-Response Curve for Ozone and Risk of Mortality and Adequacy of Current Ozone Regulations, Environ Health Perspect. 114:532-536, *available at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1440776/.

Other health impacts linked to ozone exposure are related to newborns and the developing fetus.[19] Prenatal exposure to ozone has been linked to reduced birth weight, premature delivery, and birth defects.[20] Taken as a whole, the scientific literature on ozone demonstrates that reducing levels down to and below the 2008 NAAQS of 75 ppb has large and immediate human health benefits, especially for the most vulnerable populations of Texans.

Finally, beyond its harmful effects on human health and health care costs, the Dallas-Fort Worth area's inability to achieve clean air can also have other serious local and regional economic impacts. As one example, Toyota withdrew plans to build a new $4.5 billion truck factory in the area reportedly because of concerns about ozone smog.[21] Instead, more than $2.7 billion in direct and indirect capital investment, and about 5,700 jobs from Toyota and its suppliers, went to San Antonio.[22] For farmers in the rural parts of the D-FW area and for areas downwind where D-FW ozone smog drifts at the end of summer days, ozone has the potential to damage plants, impairing their growth rates, reproduction and overall health.[23] Evidence is strong that ozone reduces yields for timber and many economically important crops such as soybeans, wheat, and cotton.

II. TCEQ's Modeling Assumptions are Flawed and Outdated and therefore, the State's Attainment Demonstration May Not Be Approvable

A. TCEQ and its' predecessors' record of attaining air quality standards by legal deadlines weak.

In determining the credibility of the TCEQ model for the 2015 DFW SIP, one must take into account the history of previous attempts to demonstrate attainment, up to and including the past two SIPS that used exactly the same 2006 modeling episodes. In the five most previous efforts to accurately forecast future DFW ozone design values and meet federal Clean Air Act attainment deadlines, the State of Texas failed—often by wide margins. In the nearly 25 years since EPA first designated DFW as nonattainment for ozone, not once has DFW ever met a

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[19] Finding greater evidence than in the last review, the ISA (2013) now finds that research is "suggestive of a
causal relationship" between long-term exposures to ozone and reproductive and developmental effects. See p. 2-20.

[20] Salam et al. (2005). Birth Outcomes and Prenatal Exposure to Ozone, Carbon Monoxide, and Particulate Matter: Results from the Children's Health Study. *Environ Health Perspec*.113: 1638-1644, http://dx.doi.org/10.1289/ehp.8111.

[21] Truck plant to open in San Antonio in 2006, create 2,000 jobs, Dallas Morning News (Feb. 5, 2003); Mitchell Schnurman, Dirty air chokes off Toyota facility, Dallas/Fort Worth Star-Telegram (Feb. 12, 2003).

[22] Neil Morton, Toyota changed jobs game in S.A., *at* http://www.mysanantonio.com/news/local_news/article/Toyota-changed-jobs-game-in-S-A-4246638.php.

[23] Davison, A.W. and J.D. Barnes, Effects of ozone on wild plants. *New Phytologist* at 135-51 (1998); Fuhrer, J., Ozone impacts on vegetation. *Ozone-Science & Engineering* at 69-74 (2002); Fuhrer, J., L. Skarby, and M.R. Ashmore, Critical levels for ozone effects on vegetation in Europe. *Environmental Pollution* at 91-106 (1997).

ozone attainment deadline, despite repeated assurances by the State of Texas that it would, and repeated attempts by other stakeholders to get Texas agencies to properly implement RACM and RACT measures that would have brought earlier reductions in ambient ozone levels.

Over the course of the last three deadlines for DFW SIPs – in 2005, 2009, and 2013 – the average gap between the DFW ozone design value predicted by the State of Texas and the actual design value when the deadline arrived is 5.8 parts per billion. The performance gap for the latest DFW SIP submitted by the TCEQ in 2011 was 9 parts per billion. This gap was preceded by the assurance of TCEQ in its final submission that its DFW SIP photochemical modeling had been "rigorously evaluated."[24]

TCEQ's 2011 SIP predicted never-before seen, historically low ozone levels in DFW by the deadline of 2013. Instead, it became the first DFW SIP to result in a higher design value at its conclusion than at its initiation.

Such a track record adds an extra burden of proof to the TCEQ 2015 DFW SIP. The Commission must demonstrate how its approach to meeting the attainment deadline this time is any different than that of its previous failures. It doesn't provide such a demonstration. In fact, the same methodology of those past failed plans is used to make the same kinds of assurances in this one, beginning with its use of an outdated 2006 modeling episode.

B. TCEQ's Modeling Episode Selection for the 2015 DFW SIP Conflicts with EPA Guidelines and Cannot be Approved

According to EPA's recommended Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2s, and Regional Haze:[25]

> It is important that emissions used in the attainment modeling correspond with the period reflected by the chosen baseline design value period (e.g., 2009-2013). Deviations from this constraint will diminish the credibility of the relative response factors**.** The base year inventory typically corresponds to the middle year of the baseline average design value period (e.g. 2011 for a 2009-2013 average design value). The base emissions inventory is the inventory that is projected to a future year. Alternatively, the base year emissions can reflect average emissions from the base year period, but the emissions year or years should be representative of the 5 year design value window."

[24] (Revisions to the State of Texas Air Quality Implementation Plan for the Control of Ozone Air Pollution, December 7th, 2011 p5-46)

[25] EPA, Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and regional Haze at 32 (Dec. 3, 2014) (emphasis added) [hereinafter "2014 Modeling Guidance"]. Although the December 3, 2014 Modeling Guidance is still in draft form, EPA has made clear that "since the revised guidance replaces and updates the existing modeling guidance without making major changes, EPA encourages states to follow the recommendations in this draft guidance until and updated version is released." Mem. from Richard Wayland, Division Director, Air Quality Assessment Division, to Regional Air Division Directors, Regions 1-10 (Dec. 3, 2014).

> ….It is therefore better to use recent design values, which are actual measurements, and modeled emissions changes to project future concentrations, than to use older ambient data to estimate the change in design values." (pp 14-15)
>
> Currently, the most recent base National Emissions Inventory (NEI) is 2011 (U.S. EPA 2014b) and NEI data are developed every three years (the next NEI year will be 2014). In most cases, *the most recent NEI year will be the most appropriate year to use for base case modeling*.[26]

Contrary to EPA's recommendation to use a modeling episode from the period of 2009 to 2013, TCEQ recycled a nine-year-old episode that it's used twice before in failing to reach ozone attainment deadlines. The episode TCEQ has chosen ends a full three years prior to the beginning of EPA's recommended five year period from which to choose a modeling episode, and a full five years before the most recent National Emissions Inventory data base that EPA also recommends.

The 2006 episode is not only obsolete, but as demonstrated by the failed 2007 and 2011 DFW nonattainment SIPs, has proven unreliable. The fact that the episode is already so old and so unreliable adds additional pressure on the State to show it can accomplish for the first time what it has been unable to do over the last quarter century: meet a federal attainment deadline for cleaner air.

C. TCEQ Arbitrarily Ignores the Most Relevant "Meteorological Conditions Conducive to Elevated Air Quality"

According to EPA's December 3rd 2014 "Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2s, and Regional Haze,

> At a minimum, several criteria should be used to select time periods that are appropriate to model: . . . Simulate a variety of meteorological conditions conducive to elevated air quality. . . . Primary ozone (8-Hour Ozone) - Choose time periods which reflect a variety of meteorological conditions that frequently correspond with observed 8-hour daily maxima concentrations greater than the level of the NAAQS at monitoring sites in the nonattainment area.[27]

The record makes clear that 2011 was the worst year for DFW ozone levels in the EPA five-year recommended model episode window. Ozone levels reached highs that lead to the DFW design value to increase from 86 to 90 ppb. The reason for this increase was largely weather related. Indeed, 2011 was the worst year for recent drought conditions in the DFW area. DFW begin experiencing exceedances of the 75 ppb ozone standard as early as April of 2011 and recorded eight-hour averages as high as 102 ppb in August. Despite DFW still being in the middle of drought conditions, the summer of 2011 is not replicated in TCEQ's 2006 model

[26] *Id*.
[27] 2014 Modeling Guidance at 16.

episode, and so the model doesn't reflect the most recent extreme meteorological conditions that lead to the highest ozone levels in DFW during the EPA 5-year recommended model episode window. 2011 should have been chosen for the DFW SIP modeling episode, not only because it was the most recent year a National Emissions Inventory was available, but because it also represented a worst case scenario for meteorological conditions conducive to higher ozone levels in DFW.

D. TCEQ's Reliance on an Outdated Modeling Episode Ignores the Demonstrated Link Between Climate Change and Higher Ozone, and therefore Arbitrarily Underestimates Future Ozone Levels

In its most recent guidance document, EPA recognized that:

> Traditionally, SIP meteorology simulations have not accounted for the impact of global emissions of carbon dioxide and other climate forcers on future meteorological conditions. Ozone concentrations have a high correlation with daily maximum temperatures over many areas in the U.S. (Camalier et al., 2007), suggestive of a potential climate connection. Recent research, taking into account temperature and other meteorological variables, indicates that in substantial, populated regions of the country, climate change could lead to higher future ozone concentrations (often called a "climate penalty") (Jacob and Winner, 2009; Bloomer et al., 2009; EPA, 2009; CARB 2010, Fiore, 2012). Assuming climate change does lead to higher ozone concentrations, there could potentially be a need for more stringent emissions reductions to counteract the higher ozone potential from warmer conditions.[28]

Indeed, Texas climatologists have almost uniformly concluded that climate change is producing hotter summers:

> The unusually warm summers in parts of Texas in 2009 and 2010 were a taste of the future. They are likely to be the typical summers of midcentury, and the unusually hot summers will be that much hotter.[29]

Another contributing author of the same report, Katharine Hayhoe, director of the Climate Science Center at Texas Tech University stated, "Climate change is no longer a future issue. We are experiencing its impacts today." (Worse global warming effects ahead for Texas, federal report says," Dallas Morning News, May 6, 2014). As the drought-driven drier and hotter weather of 2011 demonstrated, higher temperatures and higher ozone levels go hand in hand. Yet, TCEQ DFW fails to anticipate (let alone evaluate) the higher temperatures caused by global warming, or their effect on DFW ozone levels. In proposing an attainment demonstration, EPA has made clear that states have an obligation to consider "all relevant information available at the

[28] 2014 Modeling Guidance at 28.
[29] Nielsen-Gammon, *The Impact of Global Warming on Texas* (Texas A&M Univ. 2013).

time."[30] TCEQ's failure to consider impact of climate change on ozone levels, and to select a modeling episode that accurately reflects meteorological conditions and ozone levels likely to occur as a result of climate change is unreasonable. In light of TCEQ's repeated failure to accurately model likely ozone levels, the agency's selection of an outdated episode is flawed.

E. TCEQ's Proposed Attainment Demonstration is Dependent on Unreasonable and Unenforceable Future Oil and Gas Emissions

TCEQ's proposed attainment demonstration relies almost entirely on implementation of the unenforceable, future low-sulfur motor vehicle emission standards that are not scheduled to become effective until 2017, at the earliest, to get "close enough" to the required 75 ppb attainment standard. Indeed, TCEQ estimates mobile vehicle standards, over which TCEQ admits it has no control, will account for an unprecedented 57% reduction in NOx emission reductions in the DFW area by 2018.[31] In reality, TCEQ's DFW SIP is not so much a plan as a hope. It contains no new control strategies to reduce ozone-forming pollution from *any* source. Instead, as its staff members have stated in public presentations, TCEQ hopes that federally-mandated Tier 3 fuel standards and low-sulfur gasoline, which will not begin to be implemented until 2017, will somehow bring the DFW non-attainment area "close enough" to the required 2018 design value of 75 ppb for the Commission to use its familiar "Weight of Evidence" argument to win EPA approval. Given that these federal fuel measures are unenforceable by TCEQ and in any event, *will not be fully implemented until 2025,* TCEQ cannot reasonably rely on those measures to demonstrate attainment by 2018.

Moreover, EPA concluded that these changes alone wouldn't be sufficient to reach attainment for the DFW area. EPA's own modeling concluded that even for Trarrant County—which represents approximately one quarter of the total vehicle miles traveled in the DFW area—the "maximum projected decrease in an 8-hour ozone design value in 2017 is 1.09 ppb in Tarrant County, Texas, near Dallas, which is projected to be above the ozone standard." (76.2ppb)."[32] In an updated modeling exercise in February of 2014, EPA ran the same Tier 3 fuel standard scenario again and came up with a less impactful result for Tarrant County than it had the year before: a .73 ppb decrease in the projected ozone design value, resulting in an estimated 2018 level of ozone at 76.31 ppb.[33] Even with its own optimistic and unsupported modeling assumptions regarding the unprecedented, TCEQ estimated that the new EPA mandates would still leave the historically worst-performing Denton air quality monitoring site at 76.29 ppb, with Eagle Mountain Lake at 75. 64 ppb, and Grapevine Fairway at 75.38 ppb. EPA now estimates that the federal mandates will result in a reduction of only 9. 98 tons of NOx per day within the DFW non-attainment area and a 2.39 tons per day reduction in VOC in the same 10-county area. TCEQ cannot reasonably rely on federal on-road improvements to achieve

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[30] Wall v. EPA, 265 F.3d 426, 430-31 (6th Cir. 2001) (citing Memorandum from John Calcagni, Director, Air Quality Management Division, EPA, Procedures for Processing Requests to Redesignate Areas to Attainment (Sept. 4, 1992) (Calcagni Memorandum)).
[31] TCEQ AD SIP at 5-3 to 5-4.
[32] EPA, Air Quality Modeling Technical Support Document: Proposed Tier 3 Emission Standards, USEPA (Mar. 2013).
[33] EPA, Air Quality Modeling Technical Support Document: Tier 3 Motor Vehicle Emission and Standards (Feb. 2014).

attainment when EPA has concluded those measures are *insufficient* to attain the NAAQS.

It's important to note that the EPA's modeling does not show DFW monitors meeting the 75 ppb goal by 2018. It only predicts reductions by counties. Rather, it is TCEQ modeling within its 2006 episode that claims collective reductions caused by the EPA changes within and outside of the DFW non-attainment area produce a lower design value at specific monitoring locations. This is how TCEQ concludes it can get to ozone levels below 76 ppb at all DFW monitors. In the TCEQ modeling, the largest reductions in ozone occur at the worst-performing monitoring locations, including Denton, the site with the highest design value in 2014 and estimated highest design value in 2018.

Even with this change however, TCEQ leaves three DFW monitors above a flat 75 ppb level: Denton at 75.87 ppb, Eagle Mountain Lake at 75.15 ppb and Grapevine Fairway at 75.04 ppb. ("Current Ozone Modeling Results for the 10-County Dallas-Fort Worth (DFW) Area" Air Quality Division Air Modeling and Data Analysis Section Air Quality Division Chris Kite DFW State Implementation Plan Technical Information Meeting, Arlington, Texas August 12, 2014)

Adding to the uncertainty of the impact of the EPA mandates is the final, supplemental submission of data by TCEQ on January 13, 2015, predicting a 2018 design value for the Denton monitoring site using all exceedance days in the 2006 modeling episode (all days above the 75 ppb standard) of 76. 67 ppb versus a 75.43 ppb design value using only the ten worst days of ozone readings at the site during the 2006 modeling episode. Eagle Mountain Lake is predicted to have a 75.9 design value in 2018 using all exceedance days versus a 75.13 DV using only the 10 worst days in the episode. Grapevine Fairway is predicted to have a 2018 design value of 75.78 using all exceedance days in 2006 versus a 73.8 DV using only the ten worst days.[34]

At the very least, even with the TCEQ best case scenario modeling, and help from truncated EPA adjustments, the situation surrounding at three of the worst-performing DFW monitoring sites is very fluid in regards to their meeting the 75 ppb standard by the deadline of 2018. There is no room for error allowed in any of these projections. In combination with choosing an obsolete episode to model, not reflecting current meteorological conditions and excluding the effects of climate change, the razor-thin margins in the final DFW SIP add pressure on TCEQ to provide some assurance that, lacking any new control measures, the goal of 75 ppb at all sites by 2018 can be reached in the real world.

F. TCEQ employs unreliable predictions in future DFW oil and gas emissions inventories to reach attainment in the DFW SIP

Because fuel standards and the switch to low-sulfur gasoline will still leave the DFW non-attainment area dangerously close to exceeding the 75 ppb standard, and in some scenarios and monitoring locations, still exceeding it, TCEQ was obligated to implement emissions reductions to ensure attainment. Rather than implement *any* new control measures, however, the

[34] TCEQ, TECHNICAL SUPPLEMENT TO THE DECEMBER 10, 2014 PROPOSAL OF THE DALLAS-FORT WORTH ATTAINMENT DEMONSTRATION STATE IMPLEMENTATION PLAN REVISION FOR THE 2008 EIGHT-HOUR OZONE STANDARD NONATTAINMENT AREA (Jan. 13, 2015)

agency reverse engineered additional reductions by employing unreliable assumptions in forecasting 2018 oil and gas emission inventories. If TCEQ's optimistic and unsupported assumptions are even slightly off, the impacts to human health and the effects on monitors the very monitors already teetering on the edge of non-attainment will be significant.

(*1) TCEQ Unreasonably Assumes Improvements to Oil and Gas Inventories that Directly Impact the Worst-Performing Monitoring Sites in DFW*

Sensitivity of the DFW non-attainment area's worst-performing air quality monitors to the addition or subtraction in total oil and gas pollution in the TCEQ modeling episodes was best demonstrated by TCEQ staff in August 2014 at a presentation to the North Texas Council of Governments.[35] TCEQ had included forecasted lower 2018 emission rates for oil and gas facilities based on just-released 2013 production data from the Texas Railroad Commission. As a result of this new reduction in predicted emissions, the Denton air quality monitor had almost an entire 1 ppb reduction in its projected 2018 design value, from above 76 ppb to below 76 ppb. When asked if the reduction was due in whole to the reduction in oil and gas emission inventory, the TCEQ staff agreed that it was.

Denton's monitor is currently setting the DFW non-attainment design value and is expected to continue to do so in 2018. In cutting future oil and gas emissions, the TCEQ staff was also cutting the entire DFW non-attainment area's DV for the 2018 deadline, and bringing the area into compliance—at least on paper. Thus, the accurate estimation of oil and gas emissions, or at least the lack of underestimating them, is critical in the success of achieving attainment for DFW.

(2) Monitors in the DFW Non-Attainment Area's "Fracking Region" Are Recording Higher levels than Monitors in its "Non-Fracking Region."

All of the DFW air quality monitors that TCEQ predicts will barely be meeting the 75 ppb standard by 2018 are in counties with prodigious amounts of oil and gas industry pollution. They are also historically the worst-performing monitors in DFW and the ones setting the DFW design value now and in the future. These monitors are greatly impacted by oil and gas pollution.

A 2014 University of North Texas study found that ozone levels in the western half of the DFW non-attainment area, referred to as the "Fracking Region," were 8% higher during ozone season and 16% higher during winter months than ozone levels in the Eastern "Non Fracking Region" for the period 2009- 2013. During this same time, Fracking Region monitors recorded an average of 2 more exceedances a month of the 75 ppb standard than monitors in the Non-Fracking region.[36] These differences occurred despite TCEQ efforts to better control NOx and VOC emissions from oil and gas industry sources in the Barnett Shale. The five worst-performing monitor sites in the 2018 DFW SIP forecast submitted by TCEQ are in the "Fracking

[35] TCEQ, Current Ozone Modeling Results for the 10-County Dallas-Fort Worth (DFW) Area, Air Quality Division Air Modeling and Data Analysis Section, Air Quality Division, DFW State Implementation Plan Technical Information Meeting Arlington, Texas (Aug. 12, 2014).
[36] Ahmadi and Kuruvilla, An Evaluation of the Spatio-Temporal Characteristics of Meteorologically-Adjusted Ozone Trends in North Texas (Dept of Mechanical and Energy Engineering, UNT, Apr. 2014).

Region:" Denton, Eagle Mountain Lake, Grapevine Fairway, Keller and Fort Worth Northwest. The first three of these are the very sites that, even according to TCEQ's most optimistic modeling, are on the very edge of non-compliance in 2018.

(3) TCEQ Arbitrarily Freezes its Drilling Assumptions at 2103 levels

In attempting to estimate 2018 total pollution from oil and gas sources, TCEQ arbitrarily assumed production levels would remain constant from 2013 through 2018, but then applied emission rates from 2018 retroactively.[37] Although it may be difficult to predict the volatile gas market four years into the future, TCEQ cannot assume drilling levels will remain constant through 2018. Moreover, by applying 2018 emission rates to wells and facilities built and operating before 2018, the TCEQ constructs a best case scenario that is already being betrayed by the real world. Indeed, Texas Railroad Commission data shows there were more wells drilled in 2014 than 2013—1,004 new wells in 2014 vs 940 in 2013.[38] If that demonstrated rate of growth is carried through 2018, TCEQ's overly conservative forecast underestimates the number of new wells by at least 256.

TCEQ's "no new drilling" assumption is not only contrary to demonstrated growth, but belied by the agency's own predictions. At one point in its SIP modeling, TCEQ was estimating an average of only 566 new wells drilled in the Barnett Shale every year from 2014 to 2018. That's an annual count of 438 wells per year under the 2014 TRC total. Multiplying that error by four years results in the addition of over 1,700 new wells, or the equivalent of the entire inventory of new wells drilled in 2009. The erratic nature of estimating oil and gas emission inventories is the best argument for why the DFW SIP should be aiming lower, and doing more, just to meet the 75 ppb goal.

If TCEQ's arbitrary "no growth" assumption is wrong, the results could be disastrous for DFW ozone. With each new well comes additional pipelines, compressors, dehydrators, separators, and a host of other production facilities that contribute to ozone levels in the DFW area. By underestimating the likely growth of oil production in the region, TCEQ underestimates the emissions inventory and likely air quality impacts.

The growth in oil production and associated production equipment in 2014 not only contradicts the TCEQ's estimates of oil and gas emissions, but also calls into question the entire premise of those estimates – the bell-shaped "Hubbert" economic model that predicts large drop-offs in Barnett Shale production after five years, beginning in 2011. If the number of new wells increases, production will also likely increase, along with the associated air pollution. It's not at all hyperbole to say that if TCEQ is wrong in its use of the Hubbert model, its entire DFW SIP is in serious trouble. Even though production has leveled off, 2014 production was roughly the

[37] TCEQ, REVISIONS TO THE STATE OF TEXAS AIR QUALITY IMPLEMENTATION PLAN FOR THE CONTROL OF OZONE AIR POLLUTION, TEXAS COMMISSION ON ENVIRONMENTAL QUALITY at 3-36 (Dec. 10, 2014.

[38] *See* http://www.rrc.state.tx.us/media/14482/barnettshaledrillingpermitsissued.pdf.

same as 2010.[39] The 2014 well count was slightly larger than the 2013 count, the first time that has happened since 2010. This is not a bell curve in action.

Neither is the long-term trend drawn by the federal US Energy Information Administration in its comparison of all of the nation's shale gas plays.[40] In that graphic, there's a dramatic rise in production in the Barnett Shale from 2005 to 2008, at which point it settles into a relatively flat line all the way to 2013. If this trend were to be extended to 2018, the oil and gas emissions inventories used in the TCEQ DFW SIP would be larger, and so would the design value at the Denton monitor site.

It is also unreasonable to assume that all the pre-2018 wells will have 2018 emission rates, as TCEQ does in the DFW SIP. This forces an artificially low uniformity on emissions that will cross a wide spectrum of performance levels. Since the TCEQ is freezing drilling at 2013 levels, emission levels from 2013 should have also been applied to arrive at a more realistic estimate.

(4) Compressors and Flares Have a Significant Impact on Downwind Ozone Levels.

A 2012 Houston Advanced Research Center Study entitled "The Potential Near Source Ozone Impacts of Upstream Oil and Gas Industry Emissions" examined the effects of compressors and flares on surrounding ozone levels. It concluded that even one compressor or flare could have a dramatic impact on local smog,

> Routine emissions from a single gas compressor station or large flare can raise ozone levels by 3 parts per billion as far as five miles downwind, and sometimes by 10 ppb or more as far as 10 miles downwind.[41]

This same study examined the impact of multiple compressors and/or flares in a gas play on downwind ozone levels. Not surprisingly, they are significant:

> Given the possible impact of large single facilities, it is all the more conceivable that aggregations of oil and gas sites may act in concert so that they contribute several parts per billion to 8-hr ozone during actual exceedances…Major metropolitan areas in or near shale formations will be hard pressed to demonstrate future attainment of the federal ozone standard, unless significant controls are placed on emissions from increased oil and gas exploration and production....urban drilling and the associated growth in industry emissions may

[39] TCEQ, Current Ozone Modeling Results for the 10-County Dallas-Fort Worth (DFW) Area, Air Quality Division Air Modeling and Data Analysis Section, Air Quality Division, DFW State Implementation Plan Technical Information Meeting Arlington, Texas at 16 (Aug. 12, 2014).
[40] *See* U.S. Energy Information Administration, Nationwide U.S. Natural Gas Production by Shale Formation from 2005-2013, http://www.eia.gov/natural gas/.
[41] Eduardo P. Olaguer, The potential near-source ozone impacts of upstream oil and gas industry emissions, Journal of the Air & Waste Management Association (Houston Advanced Research Center, July 18, 2012).

be sufficient to keep the area in nonattainment.[42]

TCEQ estimates that the "Fracking Region" of the DFW non-attainment area hosts at least 647 large compressor stations and thousands of smaller compressor engines. As evidenced by the UNT study, their impact on ozone levels in the western part of the DFW non-attainment area could be significant, especially since all of them are concentrated in the same vicinity where the highest DFW ozone design values are being recorded, *i.e*. the "Fracking Region."

(5) TCEQ Emission Forecasts for Compressors Are Inconsistent with Oil and Gas Industry Practice

TCEQ links 2018 oil and gas pollution emissions estimates to projected production rates based on 2013 Texas Railroad Commission production reporting and application of the "Hubbert model," which predicts a sharp drop in production at the average Barnett Shale well after five years. This also applies to compressor pollution. The less production, the fewer compressors, and the less compressor pollution. TCEQ estimates that large compressor NOx pollution will decrease from 42 tons per day in 2012 (TCEQ's 2011 DFW SIP estimate) to just 16.3 tons per day in 2018 (it's 2015 DFW SIP Estimate).

The oil and gas industry, however, forecasts emissions based on the number of wells in operation and the number of facilities to exploit those wells, compressors, tanks, pipelines, dehydrators, separators, and associated equipment. While production rates in the Barnett Shale may remain stable or decline slightly,[43] the number of wells in the Barnett Shale is expected to increase, even according to TCEQ. The 2014 well count by the Texas Railroad Commission confirms an increase in new wells over the previous year—the first such rise since 2010.

In addition, as far as can be determined, TCEQ is only counting new wells in its estimates for oil and gas pollution, not the number of wells re-fracked over the period 2014-2018. Each Barnett Shale well can be fracked multiple times. This is important because the more wells that are drilled and re-fracked, the more compressors and other production facilities will be added to compliment them. These production facilities that emit the most air pollution in the natural gas energy cycle. According to a 2013 study by the Rand Corporation,

> Most emissions are related to ongoing activities, i.e., gas production and compression, which can be expected to persist beyond initial development and which are largely unrelated to the unconventional nature of the resource.[44]

So not only will there be more wells operating in the Barnett Shale in 2018, they'll also be more compressors. Moreover, as a gas field ages and become more developed, like the Barnett Shale, operators want to squeeze as much gas out of each well as possible by re-fracking and adding more compressors, particularly lift compressors:

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[42] *Id*.

[43] Patzek, et al., Gas Production in the Barnett Shale Obeys a Simple Scaling Theory Proceedings of the National Academy of Sciences (Dec. 2013).

[44] Litovitz, et al, Estimation of Regional Air-Quality Damages from Marcellus Shale Natural Gas Extraction in Pennsylvania, Environmental Research Letters, v. 8, no. 1, #014017, Jan-Mar. 2013, p. 1-8.

> Now, what can be done to improve the flow rate? Which can be changed easiest, quickest and cheapest? (Some are as easy as a choke change or adding a compressor.
>
> . . .
>
> Thus the decline of the wells reduces the capacity of the compressing station and necessitates the installation of more compressors as the field grows older"
>
> . . .
>
> In today's competitive arena, Gasjack™ compressors have enabled operators and owners to dramatically increase production, thereby extending the economic life and recoverable reserves of their properties….Whether your needs are increasing reserve recovery in older marginal wells producing from permeable formations, or used as the first stage of compression on gathering systems, the Gasjack offers a profitable solution to a variety of applications.[45]

In direct contradiction to the "Hubbert economic model" used by TCEQ to forecast a steep drop-off in Barnett Shale production, and emissions, by the 2018 DFW SIP deadline, the industry says wells can expect to be steady producers for a lengthy period of time:

> A common misconception about Barnet Shale gas wells is that they come online with high flow rates and then fall off quickly, giving them a relatively short productive life. Data from the Railroad Commission of Texas, the Powell Shale Digest and RigData (which tracks natural gas wells in Texas), shows that Barnett Shale natural gas wells are very productive for long periods of time, and production stays very level after initial declines in the first few years.[46]

A 2013 UT Bureau of Economic Geology Department study of the Barnett, believed to be "the most thorough assessment yet of the natural gas production of the Barnett Shale,"

> foresees slowly declining production through the year 2030 and beyond and total recovery at greater than three times cumulative production to date… in the base case, the assessment forecasts another 13,000 wells would be drilled through 2030. In 2011 and 2012 more than 2900 wells were actually drilled, in line with the forecast, leaving just over 10,000 wells remaining to be drilled through 2030 in the base case.[47]

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[45] George E. King Engineering, Oil and Gas Consultant, "How a Well Flows" 2009, http://gekengineering.com; Samuel S. Wyer, "Necessary Use and Effect of Gas Compressors on Natural Gas Field Operating Conditions" (1916).

[46] Ed Ireland, Executive Director, Barnett Shale Energy Education Council website, "Barnett Shale Natural Gas Wells are Very Productive" (Sept. 18, 2012).

[47] Feb. 28, 2013 Press Release, Bureau of Economic Geology (BEG) at The University of Texas at Austin, "New, Rigorous Assessment of Shale Gas Reserves Forecasts Reliable Supply from Barnett Shale Through 2030."

The UT study predicts that production in the Barnett Shale for most wells will not even reach its peak until approximately 2018 and it estimates a majority of wells will have a 25 year life-span. Moreover, the areas of the Barnett Shale with the richest long-term production value are precisely the part of the DFW non-attainment area hosting the worst-performing air monitors that are driving the DFW ozone design values – Denton, and Tarrant Counties.

Because of the impact of oil and gas pollution on those monitors, success of the TCEQ DFW SIP depends on an accurate forecasting of that pollution, or at least not underestimating it. And yet, by downplaying the continued growth in the number of wells and related production facilities, as well as the pollution they will emit, the Commission is creating an illusion of certain attainment where there's actually much doubt.

(6) Estimates of Small Compressor Pollution are Wholly Speculative

In addition to the influence of the 647 compressors large enough to be classified as "point sources," there are untold thousands of smaller compressors being used in the nonattainment area that remain unidentified in any systematic way. Since they don't have to be individually permitted, the State doesn't know how many of these compressors are operating, or have any way of verifying their cumulative emissions.

Instead, TCEQ is basing its count and emissions of these compressors on the extrapolation of 2013 Texas Railroad Commission production rates within its 4 square kilometer modeling grids combined with predictions from the generic Hubbert economic performance model. The Commission is theoretically allocating a certain number of small compressors based on the gas production within each grid. Using this methodology, estimates of 2018 smog-forming pollution from these small compressors have totaled seven tons per day within the "Area Source" category. Whether this is approaching an accurate figure, no one knows. But if the industry is correct, and the number of these compressors rises as a gas play ages, then it is likely TCEQ is underestimating the amount of pollution from these sources.

(7) TCEQ's Oil and Gas Emission Estimates Do Not Account for Planned or Emergency "Blowdowns" at Facilities.

Blowdowns refer to the venting of natural gas contained inside a pressure vessel, pipeline, or other kinds of equipment, directly into the atmosphere. Such blowdowns can release many additional tons per day of smog-forming VOCs in intense plumes. Much like the industry "upsets" in the Houston Ship Channel that caused spikes in downwind ozone levels, these blowdowns could be causing similar spikes at downwind air quality monitoring sites in the DFW area. If routine emissions from compressors can cause 3-10 ppb increase in ozone downwind, then it's likely that a serious blowdown at a compressor could multiply that impact.

It is difficult to estimate the amount of pollution released from these kinds of events, but a 1996 study prepared for the federal Energy Information Administration determined that blowdowns were responsible for emitting up to 10% of all the methane released by the entire

industry, over 30 billion standard cubic feet.[48] More recent evidence for the underestimation of oil and gas pollution from blowdowns can be found in the 2010 Greenhouse Gas Inventory, which states that "[n]atural gas well venting due to unconventional well completions and workovers, as well as conventional gas well blowdowns to unload liquids have already been identified as sources for which Natural Gas STAR reported reductions are significantly larger than the estimated inventory emissions."[49]

Given the concentration of oil and gas industry facilities in the vicinity of the worst-performing DFW air quality monitors driving the non-attainment area design values and the razor-thin "demonstration" of attainment in the TCEQ modeling episode, any significant underestimation of these emissions would make attainment impossible.

(8) TCEQ Underestimated the Volume and Impact of Oil and Gas Industry Emissions from the Haynesville Shale

TCEQ maps portending to show oil and gas production in Texas display a high concentration of facilities and production in Limestone, Falls, Robertson and Leon Counties, directly southeast, or predominantly upwind of the DFW non-attainment area, during ozone season. For lack of a better general geographic description, we're locating them in what might be called the lower Haynesville Shale. Specifically, these counties have large numbers of permitted compressor stations, which collectively, could be sending as much, or more, smog-forming NOx into the DFW non-attainment area as the coal-fired power plants that are also hosted by some of the same counties. To our knowledge, TCEQ has never released any estimates for the volumes of NOx and VOCs coming from these sources, currently, or in its 2018 modeling exercise.

Assuming TCEQ is using the same methodology to estimate 2018 emissions from these sources as it's applying to the DFW non-attainment area, the amount of oil and gas pollution from them could be significantly underestimated. Because these sources are upwind of DFW during ozone season, their impact could also be significantly underestimated.

(9) TCEQ's DFW SIP Attainment Demonstration Modeling Allows No Margin for Error

A series of unknowns, current and future, make estimating 2018 oil and gas pollution volumes more problematic than perhaps any other major source of smog-forming pollution in the DFW non-attainment area. This was proven by the TCEQ staff itself, when inside of just one year, it radically changed its own forecasts of 2018 Barnett Shale air pollution based on new production figures for the Barnett Shale from the Texas Railroad Commission. Using 2012 TRC data for the Shale, it estimated oil and gas pollution in January of 2014 to total 97 tons per day—approximately 39 tpd of NOx and 58 tpd of VOCs. When 2013 TRC numbers for the Barnett Shale were plugged into TCEQ's (disputed) formula for estimating future emissions, those numbers decline to a total of 66 tons per day in the TCEQ DFW SIP submitted in January

[48] EIA, Methane Emissions from the Natural Gas Industry, Volume 7, Blow and Purge Activities, National Risk Management, Research laboratory (June 1996).
[49] U.S. EPA, Inventory of U.S. Greenhouse Gas Emissions and Sinks (1990-2008) at 3-47, U.S. EPA # 430-R-10-006 (Apr. 2010).

2015—16. 5 tpd of NOx, and 50 tpd of VOCs.

TCEQ's formula is based on production rates, not well or facility counts. But the point of this difference is how much oil and gas pollution levels are dependent on variables completely out of TCEQ's control. Even using TCEQ's own formula, if oil and gas pollution levels can decrease by over 30 tpd in a single year, then it is possible that such pollution can also increase by that amount or more in a future 12 month period on the way to the 2018 deadline to meet the 75 ppb standard. Yet, TCEQ fails to evaluate, let alone acknowledge, that potential.

Moreover, the differences in oil and gas pollution NOx and VOC totals between January 2014 and January 2015 are significantly greater than the reductions in pollution estimated to be had by the federal Tier 3 standards and fuel switch in 2017 that TCEQ is relying upon to reach DFW attainment goals. Given the location of the sources of this pollution, such miscalculations could wreak havoc on TCEQ's estimates of 2018 DFW design value. In light of this uncertainty, TCEQ's failure to meaningfully evaluate or consider *any* new controls being required in the SIP for the oil and gas industry, or any other sources of smog pollution, is unreasonable.

G. TCEQ's Contingency Measures are Unenforceable, and therefore Unlawful

Section 172(c)(9) of the Clean Air Act requires that nonattainment plans include contingency measures:

> Such plan shall provide for the implementation of specific measures to be undertaken if the area fails to make reasonable further progress, or to attain the national primary ambient air quality standard by the attainment date applicable under this part. Such measures shall be included in the plan revision and shall take effect in any such case without further action by the State or the Administrator.[50]

To satisfy the requirements of the Act, these measures must be enforceable.[51] EPA has interpreted the mandate that such measures "shall take effect . . . without further action" to mean that "no further rulemaking actions by the State or EPA would be needed to implement the contingency measures."[52] Emission reductions are "enforceable" if: (1) they are independently verifiable; (2) program violations are defined; (3) those liable for violations can be identified; (4) the District, State, and EPA maintain the ability to apply penalties and secure appropriate corrective actions where applicable; (5) citizens have access to all the emissions-related information obtained from the source; (6) citizens can file suits against sources for violations; and (7) they are practicably enforceable in accordance with other EPA guidance on practicable enforceability.[53]

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[50] 42 U.S.C. § 7502(c)(9).

[51] *Id.* § 7502(c)(7) (requiring nonattainment SIPs to comply with section 7410(a)(2)(A), which in turn, requires that emission limits and other control requirements necessary to comply with the NAAQS be enforceable).

[52] 59 Fed. Reg. 41998, 42015 (Aug. 16, 1994); see also 57 Fed. Reg. 13498, 13512 and 13544 (April 16, 1992).

[53] EPA, "Incorporating Emerging and Voluntary Measures in a State Implementation Plan" at 3-4 (Sept. 2004).

The two main contingency measures relied upon by TCEQ—excess emission reductions from state mobile source measures and emission reductions achieved through incentive programs—fail to meet these criteria for enforceability. As TCEQ knows, the mobile source control measures relied upon here to provide excess emission reductions are not actually approved into the state implementation plan. As a result, they are not enforceable by EPA or through independent citizen enforcement. Indeed, the State is free to amend or rescind these measures altogether without EPA oversight. Thus, these emission reductions are not creditable as contingency measures. The emission reductions achieved as the result of the various subsidy programs, volunteer mobile emissions, and federal fuel standards are likewise unenforceable by EPA or citizens. EPA itself has explained that emission reductions, such as those achieved by TCEQ's incentive programs, that are "not enforceable against individual sources" are "voluntary" and are subject to a cap on SIP credit.[54]

F. TCEQ Improperly Relies on Unenforceable Measures, Double-Counting, and Flawed Assumptions to Support its Weight of Evidence

TCEQ admits that at the end of the summer of 2018, the deadline for demonstrating compliance with the 2008 eight-hour ozone NAAQS, several of the DFW area's monitors will have design values exceeding the NAAQS.[55] At best, the Denton air quality monitor is estimated to still be registering 75.43 ppb of ozone. At least one other DFW monitor site – Eagle Mountain Lake – is estimated by TCEQ to be 75.13 ppb. These monitor sites have seen their 2018 levels adjusted continuously by TCEQ over the past year, primarily via dubious tweaks to oil and gas emissions, in order to bring their forecasted levels down from even higher levels of ozone.

TCEQ argues that the Weight of Evidence it's submitting as part of the DFW SIP will guarantee compliance by 2018 and that these levels are already "close enough" to the 75 ppb standard to allow EPA to approve it. However, despite at least five tries going back over two decades, the Weight of Evidence in a DFW SIP submitted by the State of Texas has never been up to that challenge. There's no reason to believe that has changed with this submission.

Indeed, TCEQ's Weight of the Evidence analysis improperly relies on unenforceable and uncertain measures, fails to ensure that other measures are not double counted, and fails to properly account for uncertainty in its emissions and meteorological assumptions. First, TCEQ's assessment of existing emissions relies upon numerous control measures that are uncertain and unenforceable. EPA's Weight of the Evidence guidance expresses a strong preference for measures that are quantifiable and certain to exist throughout the duration of the planning period.[56] By way of example, TCEQ assumes emissions benefits from voluntary energy efficiency and renewable energy projects, federal fuel and engine standards, and volunteer

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[54] See EPA, "Incorporating Emerging and Voluntary Measures in a State Implementation Plan" at 1 and 5 (Sept. 2004).
[55] AD SIP at 3-68 to 3-70
[56] 2014 Modeling Guidance at 186; EPA, Roadmap for Incorporating Energy Efficiency/Renewable Energy Polices and Programs into State and Tribal Implementation Plans, App'x H: Weight of Evidence Pathway, EPA-456/D-12-001i at H-4 (July 2012).

emissions reduction programs.[57] As an initial matter, TCEQ cannot reasonably demonstrate attainment in 2018 (even through a qualitative Weight of Evidence analysis), by relying on federal fuel standards that are not scheduled to be fully implemented until 2025—seven years after the Clean Air Act's attainment deadline. In any event, these voluntary fuel and efficiency measures are not actually approved into the state implementation plan, and the State therefore free to amend or abandon them altogether. TCEQ's reliance on wholly uncertain and unenforceable measures seriously undermines the reliability and of TCEQ's Weight of Evidence analysis.

TCEQ compounds this error by failing to ensure, as required by EPA's guidance, that any Weight of Evidence measures are not double counted in another part of the analysis. As noted TCEQ relies on voluntary fuel emissions reductions both as part of its Weight of Evidence analysis and its existing controls analysis. As a result, the agency assumes benefits in its Weight of Evidence analysis that have already been accounted for in the control strategies analysis.[58]

Perhaps even more troubling, TCEQ fails to properly account for uncertainties its emissions and meteorological trends analyses. As EPA's guidance makes clear, states "must have an accurate accounting of the year-to-year changes in actual emissions," and must adjust their trend analyses to account for likely changes in meteorological or emission conditions.[59] "An area may appear to be on track to attain the NAAQS (or close to attaining), but in reality may need substantial additional emissions reductions in order to attain under average or above average meteorological conditions." By way of example, and as discussed above,[60] TCEQ relied upon overly optimistic meteorological data. Instead of relying upon outdated 2006 meteorological data, TCEQ should have considered more recent data, which is more likely to approximate average future conditions caused by global warming. TCEQ's Weight of Evidence analysis fails to consider whether 2006 meteorological conditions result in overly optimistic design value predictions. Similarly, TCEQ's Weight of Evidence analysis fails to consider an obvious factor in the apparent downward trend in ozone-causing emissions over the last several years—the economic recession of 2008-2011. When increased economic activity—that is, increased electricity generation and vehicle emissions—are considered along with the likely continuation of intense heat and drought conditions, TCEQ's assumption that DFW ozone levels will continue to improve appears, at best, incomplete, at worst, catastrophically wrong.

Indeed, more than any other previous DFW SIP, this 2015 incarnation has more potential for failure. Its modeling episode is sorely outdated and doesn't reflect current meteorological trends. It's assumptions about a huge category of industrial emissions contradicts the industry's own methodology and relies on a series of guesstimates, instead of verifiable volumes. But despite the State's own history of failure and the high propensity for failure this time, the final numbers in the TCEQ DFW SIP don't reflect any margin of error at all. For example, even the slightest annual change in the volatile fortunes of the oil and gas industry between now and 2018 could ruin any chance of the DFW region meeting the 75 ppb standard. A return of drought-driven summers could do the same. Instead of accounting for these frailties in its attainment

[57] AD SIP at 4-4 to 4-6.
[58] *Compare* AD SIP Chapter 4.2 *with* Chapter 5.
[59] 2014 Modeling Guidance at 179.
[60]

demonstration and supplementing it with more aggressive controls on major sources to provide a margin of safety in its estimates, the TCEQ is gambling that it can do what it has never done before without doing anything but waiting.

TCEQ's approach to the modeling in its DFW SIP is a house of cards. More must be required in the plan to account for possible error, and insure compliance with the Clean Air Act by the 2018 deadline. After five attempts and five failures, a TCEQ plan for DFW should be doing more than just waiting.

II. TCEQ Failed to Meaningfully Consider and Implement All Reasonably Available Control Measures, including Reasonably Available Control Technology, as Required by the Clean Air Act.

Under section 172(c) of the Clean Air Act, 42 U.S.C. § 7502(c), the DFW area must attain compliance with the 2008 eight-hour ozone standard of .075 ppm as expeditiously as practicable, but no later than December 31, 2018. As explained above, even assuming TCEQ's reliance upon outdated, erroneous, and overly optimistic modeling assumptions was lawful (which it was not), TCEQ admits that the DFW area will *not* achieve timely attainment of the 2008 eight-hour standard. Despite the Clean Air Act's clear requirement under these circumstances to implement "*all* reasonably available control measures," ("RACM") *including* "reasonably available control technology" ("RACT") as expeditiously as practicable, TCEQ declines to meaningfully evaluate (let alone implement) any such controls. Ignoring the results of its own modeling *nonattainment* demonstration and the Dallas-Fort Worth area's forty-year history of failing to attain compliance with the ozone NAAQS, TCEQ essentially concludes that current regulations and emission controls are good enough. TCEQ is wrong, and must reevaluate all such controls.

Consistent with determinations in neighboring states, national adoption of SCR technology, the use of SCR in Texas as well as historical emissions achievements, and TCEQ's own statements concerning SCR, Texas must consider emission limits derived from SCR controls as RACT for coal combustion and cement kilns.

A. <u>The Legal Standard for RACM and RACT</u>

Under section 172(c)(1) of the Clean Air Act, 42 U.S.C. 7502(c)(1), each nonattainment state implementation plan "shall provide for the implementation of all reasonably available control measures as expeditiously as practicable (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology) and shall provide for attainment of the national primary ambient air quality standards." Thus, as EPA has made clear, "in addition to demonstrating attainment, air agencies are required to conduct a Reasonably Available Control Measures (RACM) analysis to determine if they can advance their attainment date. Since areas are required to attain as expeditiously as practicable, results of the RACM analysis may indicate attainment can be achieved earlier." [61]

[61] 2014 Modeling Guidance at 17.

In order for the EPA to determine whether an area has provided for implementation as expeditiously as practicable," the State must explain why the selected implementation schedule is the earliest schedule based on the specific circumstances of that area. Such claims cannot be general claims that more time is needed but rather should be specifically grounded in evidence of economic or technologic infeasibility."[62] Moreover, contrary to TCEQ's assertion that consideration of RACM or RACT is somehow optional for contributing sources, EPA has made clear that "all sources contributing to the nonattainment situation are required to implement restrictive available control measures even if it requires significant sacrifice."[63]

(1) RACM

EPA has defined RACM as any potential control measure for application to point, area, on-road and non-road emission source categories that is: (1) technologically feasible; (2) economically feasible; (3) does not cause "substantial widespread and long-term adverse impacts"; (4) is not "absurd, unenforceable, or impracticable"; and (5) can advance the attainment date by at least one year.[64]

(2) RACT

RACT is a "technology-forcing" standard intended to ensure that polluting sources are controlled consistent with available methods for reducing pollution. As a result, RACT is a stringent standard, and is designed to induce and require improvements in control technology and reductions in pollutant emissions. Indeed, EPA has long maintained that "RACT should represent the toughest controls considering technological and economic feasibility that can be applied to a specific situation" and that "[a]nything less than this is by definition less than RACT."[65] Contrary to TCEQ's assertion that:

RACT is defined as "the lowest emissions limit that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility."[66] It comprises two parts: (a) technological feasibility and (b) economic feasibility.

a. Technological Feasibility

"The technological feasibility of applying an emission reduction method to a particular

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[62] Mem. from John S. Seitz, director of EPA's Office of Air Quality Planning and Standards, to EPA regional air division directors (Nov. 2, 1999).
[63] Memorandum from Roger Strelow, Assistant Administrator for Air and Waste Management, U.S. EPA, to Regional Administrators, Regions I - X (Dec. 9, 1976), at 2 (hereinafter "Strelow Memo").
[64] 74 Fed. Reg. 2945 (Jan. 16, 2009).
[65] Strelow Memo at 2.
[66] COMAR 26.11.01.01.B(40); accord U.S. EPA, State Implementation Plans; Nitrogen Oxides Supplement to the
General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, 57 Fed. Reg. 55,620,
55,624 (Nov. 25, 1992).

source should consider the source's process and operating procedures, raw materials, physical plant layout, and any other environmental impacts such as water pollution, waste disposal, and energy requirements."[67]

There is no dispute that installation of SCR would be technologically feasible at Coal plants in northern and eastern Texas. SCR is a mature technology that is, as described more fully below, installed on half the U.S. coal fleet, and several of Texas's own coal EGU fleet.

b. Economic Feasibility

As EPA has explained, "[e]conomic feasibility considers the cost of reducing emissions and the difference in costs between the particular source and other similar sources that have implemented emission reduction."[68] More specifically, EPA presumes that:

> it is reasonable for similar sources to bear similar costs of emission reductions. Economic feasibility rests very little on the ability of a particular source to 'afford' to reduce emissions to the level of similar sources. Less efficient sources would be rewarded by having to bear lower emission reduction costs if affordability were given high consideration. Rather, economic feasibility for RACT purposes is largely determined by evidence that other sources in a source category have in fact applied the control technology in question.[69]

EPA has further explained that RACT is not intended to enshrine existing installed control technologies, but rather is technology-forcing.[70] Accordingly, "[i]n determining RACT for an individual source or group of sources, the control agency, using the available guidance, should select the best available controls, *deviating from those controls only where local conditions are such that they cannot be applied there and imposing even tougher controls where conditions allow*."[71]

Moreover, in recent comments regarding Pennsylvania's proposed RACT regulation for coal plants, EPA has clarified that the reason for installation of the control technology is not material and that states should look to more recent technical information, which "logically includes actual emission rates achieved in practice by sources that have installed controls in response to a settlement agreement or in response to state rules adopted in response to the NOx SIP Call or the CAIR (see for example, 40 CFR 51.121-51.124) as well as Federal Implementation Plans (FIPs) (40 CFR 52.35 and Part 97) and actions on section 126 petitions (40 CFR 52.34) promulgated as a consequence of these rules."[72]

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[67] U.S. EPA, State Implementation Plans; General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990; Supplemental, 57 Fed. Reg. 18,070, 18,074 (Apr. 28, 1992).
[68] 57 Fed. Reg. at 18,074.
[69] *Id*.
[70] Strelow Memo at 2.
[71] Strelow Memo at 2 (emphasis added).
[72] EPA Comments on Proposed Amendments to Chapters 121 and 129 Presumptive Reasonably Available Control Technology (RACT) requirements and RACT emission limitations for certain major stationary

While RACT and RACM overlap significantly and involve consideration of similar factors like technological and economic feasibility, there is a distinction. A control measure must be able to advance attainment of the area towards the meeting the NAAQS for that measure to be considered RACM, whereas advancing attainment of the area is not an explicit factor in evaluating RACT because the benefit of implementing RACT is presumed under the Clean Air Act.[73]

B. TCEQ Ignores Obvious, and Legally-Mandated, RACM/RACT Strategies for Cement Kilns

Despite TCEQ's failure to actually demonstrate attainment in the DFW area, and despite the Clean Air Act's explicit directive to implement "all reasonably available control measures" including RACT "as expeditiously as practicable," TCEQ fails to implement (let alone meaningfully evaluate) RACM or RACT for any of the largest sources of NOx in and around the DFW area—cement kilns and coal-fired electric generating units. Given the widespread application of SCR across the electric generating and cement kiln industry, a less effective technology could only be chosen for a specific source if SCR physically could not be applied at that specific source.

In its 2011 response to comments urging the agency to require RACT on major sources contributing to DFW ozone, TCEQ asserted that it had "rigorously" modeled attainment, and therefore RACM and RACT were unnecessary. The agency asserted "photochemical modeling indicates the DFW area will attain the 1997 eight-hour ozone standard in 2012 and additional control measures are not necessary for the area to demonstrate attainment by the attainment date."[74] In fact, the State's modeling was off by a full 9 ppb in predicting the design value in 2013, and that SIP became the first in DFW history to result in higher ozone levels at is conclusion compared to when it began. DFW could have used the control measures TCEQ rejected in the name of its modeling. Despite its history of erroneous predictions, TCEQ uses the same excuse to avoid following both the letter and spirit of the Clean Air Act. Here, as it did in 2007, TCEQ contends that RACT/RACM are unnecessary because it has demonstrated that it will attain compliance with the NAAQS. Once again, TCEQ is wrong.

(1) Selective Catalytic Reduction on the Midlothian Cement Kilns is RACM/RACT

Three Midlothian cement plants just south of the Dallas-Tarrant Counties line – TXI, Holcim and Ash Grove - with a total of four large dry kilns, represent the largest concentration of

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sources of oxides of nitrogen (NOx) and volatile organic compound (VOC) emissions. [44 Pa.B. 2392, April 19, 2014], Enclosure 2 at 2, attached as Exhibit 9.

[73] TCEQ, APP'X A: REASONABLY AVAILABLE CONTROL TECHNOLOGY ANALYSIS. HOUSTON – GALVESTON - BRAZORIA REASONABLY AVAILABLE CONTROL TECHNOLOGY ANALYSIS UPDATE, STATE IMPLEMENTATION PLAN REVISION FOR THE 1997 EIGHT-HOUR OZONE STANDARD, Project No. 2010 028-SIP-NR (2011).

[74] TCEQ, RESPONSE TO COMMENTS RECEIVED CONCERNING THE DALLAS-FORT WORTH (DFW) ATTAINMENT DEMONSTRATION (AD) STATE IMPLEMENTATION PLAN (SIP) REVISION FOR THE 1997 EIGHT-HOUR OZONE STANDARD at 23.

cement manufacturing in the U.S. In its January 13, 2015 Supplement to the DFW SIP, the Midlothian cement plants account for up to 17.6 tons of NOx a day and .78 tons of VOCs a day in the projected 2018 emissions inventory, for a combined impact of 18. 42 tons a day of ozone precursors emitted. The plants also emit large amounts of Particulate Matter and Sulfur Dioxide pollution.

Midlothian, Ellis County is in the DFW non-attainment area, and has been for a decade. No other attainment area in the U.S. contains as much cement plant manufacturing capacity or hosts as much cement plant pollution. Because all three kilns are in close proximity to one another their emissions form a "super plume" upwind of metropolitan DFW during ozone season.

Studies have demonstrated that Midlothian cement plant pollution significantly affects DFW ozone levels. In fact, in 2005 and 2006, two sets of TCEQ's own "sensitivity tests" performed to quantify the impact of the Midlothian cement plants on air quality in the DFW non-attainment area as part of a new 2007 State Implementation Plan for Ozone. This new plan DFW SIP was necessitated, in large part, by TCEQ's underestimation of the number of diesel generators connected to Barnett Shale gas drilling in DFW, and EPA's rejection of the TCEQ plan that was initially approved. E PA's rejection was based on four monitors in Tarrant and Dallas Counties registering ozone levels over 85 ppb in modeling runs performed by the state and EPA. Thus, a "do-over" implementation plan to reach attainment with the 85 ppb standard was necessary to obtain federal approval. Both sets of cement plant sensitivity tests were carried out by Environ, on behalf of the Texas Commission on Environmental Quality.

The August 2005 Environ sensitivity tests identified the worst-case scenarios for maximum impact of the plumes of all three cement plants to air quality in the DFW non-attainment area. It used projected 2010 future year emissions for an episode from August 13-22, 1999. It demonstrated a maximum impact of over 11 ppb along the Parker-Tarrant County line, with impact of 1 to 11 ppb extending over 28 North and Central Texas counties:

Worst Case – All Three @ Max

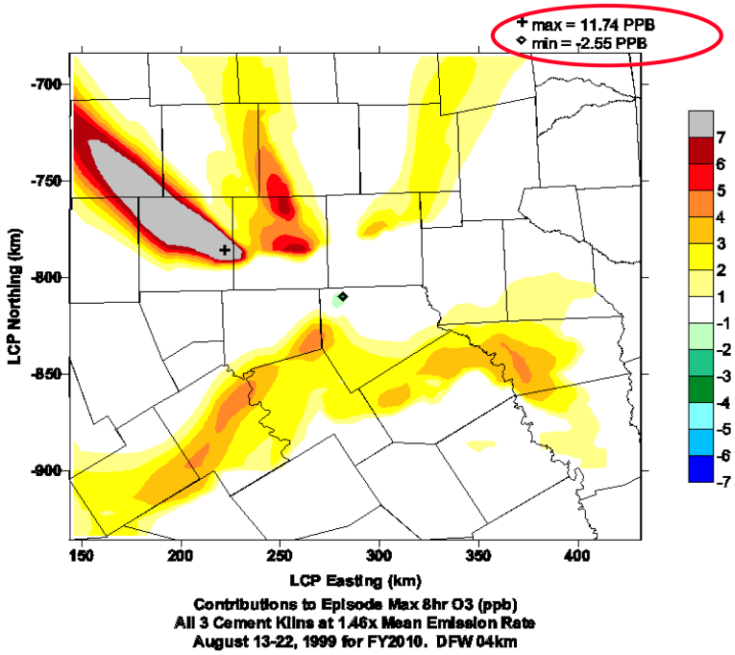


Figure 1 : Final Report, Accounting for the Impacts of Variable Cement Kiln Emission Rates on Ozone Formation in the Dallas/Fort-Worth Area, Work Order No. 582-04-65563-08, Prepared for Texas Commission on Environmental Quality, ENVIRON International August 31, 2005).

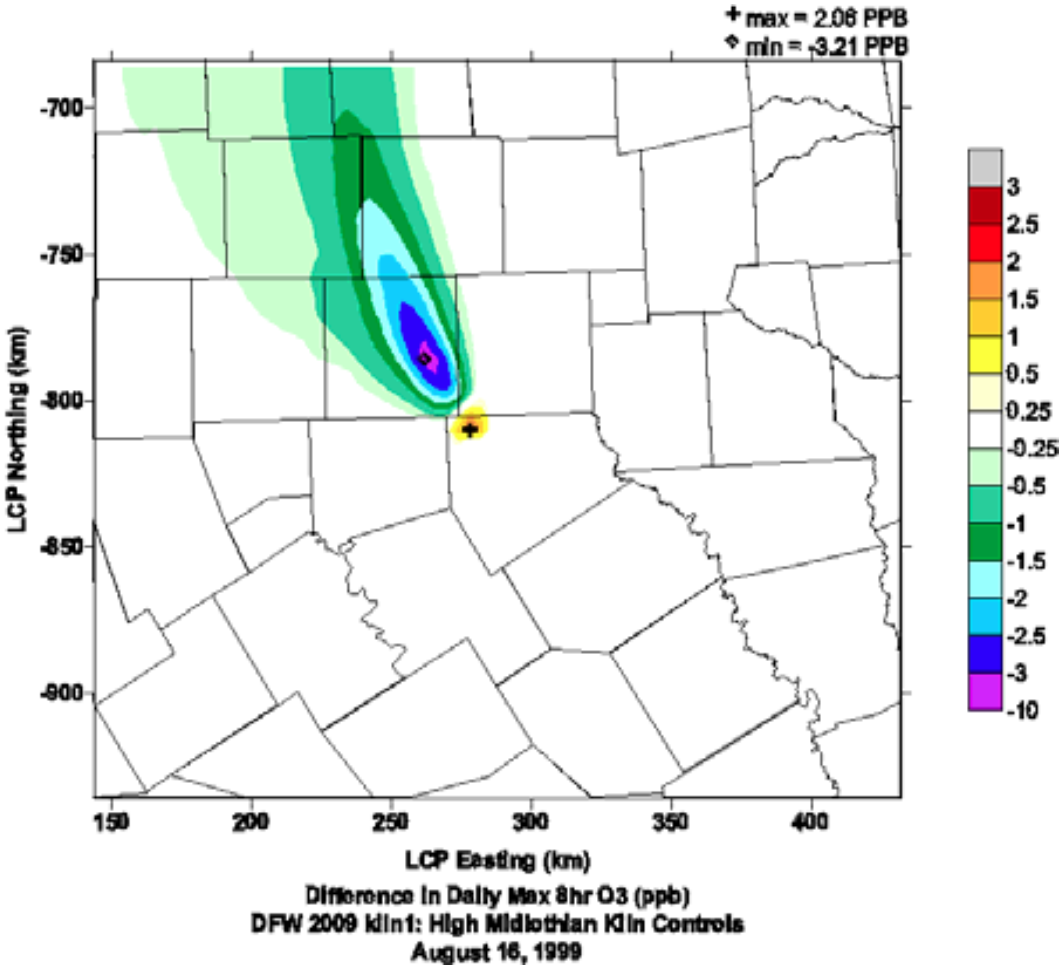
Sensitivity runs by Environ in 2006 demonstrated how reductions in kiln emissions from implementation of "low, " or Selective Non-Catalytic Reduction (SNCR) controls, and "high," or Selective Catalytic Reduction (SCR) controls would impact air quality in the DFW non-attainment area:

> Two cement kiln sensitivity tests were analyzed for 8-hour ozone in the Dallas/Fort Worth August 13-22, 1999 episode for the 2009 future year. The 2009 base case NOx emissions from the Midlothian cement kilns was 28 tpd. The high control scenario (run44.fy2009.a1.kiln1) reduced the kiln emissions by 20 tpd NOx. The low control scenario (run44.fy2009.a1.kiln2) reduced Midlothian kiln NOx by 10 tpd.[75]

Results from this second set of tests demonstrated that future 8-hour ozone design values would all be lower at all monitoring stations when applying the high cement kiln control.[76] In the runs performed, the greatest impacts to 8-hour ozone reduction were in Tarrant County, where the

[75] Environ Memorandum, To: Pete Breitenbach, From Edward Tai and Greg Yarwood, February 22, 2006, "Dallas/Fort Worth 2009 Midlothian Cement Plant Sensitivity Tests" at 1.
[76] Id. at 10.

2009 8-hour ozone design value was reduced nearly 1.0 ppb when applying the "high level," or SCR, controls. The high cement kiln control reduced the future design value at least 0.1 ppb at 5 of the 9 monitoring sites.[77] Among the 2009 baseline "exceedance" cells, (i.e. cells exceeding the 85 ppb standard in the modeling episode), 14 % (166 out of 1199) were reduced at least 1 ppb. The controls were most effective on August 16, when 38 % (84 out of 223) exceedance grid cells were reduced at least 1 ppb, accounting for half the episode total; the exceedance area was lower by 5 %.[78]



The March 16th, 2006 Fort Worth Star-Telegram put the test results in wider context:

> Using detailed computer models, state regulators have concluded that requiring the three cement plants in Midlothian to add modern pollution controls would apparently lower ozone levels in Fort Worth and Arlington almost enough to meet federal standards by 2009.

In November 2013, Dr. Neelesh Sule of UTA's Engineering Department presented results to the North Texas Council of Governments of a new sensitivity test involving the

[77] *Id*. at 12.
[78] *Id*.

Midlothian cement plants using the same 2009 modeling episode as the 2006 TCEQ tests. He examined the impact of 90% or SCR, controls on the kilns between the critical hours of 6 am and 12 Noon on August 16.

Monitoring Region	Time period	Controls Selected	Emission variables	Emission Reduction by Selected Control, tons	Total Emission Reduction, tons	Percent Reduction by Selected Control measure	Percent of Supplemental Emission Reduction	Total Percent Reduction	Reduction of Previous Day Ozone in 7PM – Midnight
Collin	6 am – 12 noon	EGU	P5Ka 6-12nN	0.187	1.009	16.68	73.32	90	Dallas: 3.33 ppb. (50.94 ppb to 47.61 ppb)
Collin	12noon – 3 pm	EGU	P5Ka 6-12nN	0.187	1.009	16.68	73.32	90	Dallas: 3.33ppb. (50.94 ppb to 47.61 ppb)
		Clean Fleet Program	LEl 9-3pm N	0.139	0.139	5.2	0	5.2	
Tarrant	6 am – 12 noon	Cement Kilns	P7El 6-12n N	4.35	6.024	65.00	25.00	90	Denton: 2.04 ppb (42.21 ppb to 40.17 ppb)

Applying this reduction produced a decrease of 2.04 ppb in the Denton air quality monitor - the monitor driving the current DFW design value.[79]

A preponderance of the evidence shows both that the Midlothian cement plants have a significant cumulative detrimental impact on DFW ozone levels, and that SCR-like reductions in their pollution would have a significant beneficial impact on DFW air quality. Implementation of SCR on the cement plants could both hasten compliance with attainment of the 75 ppb standard and provide a margin of safety in reaching the goal at all in light of the uncertainty surrounding the TCEQ's demonstration of attainment on paper.

(2) SCR on Cement Kilns Has Been Shown to Significantly Reducing Smog-Forming Pollution

From 1996 to1998 tests for SCR conducted on cement kilns in Germany, Austria, Sweden and Italy. Since 2001, there have been six successful applications of full-scale SCR units on cement plants.

2001: Full scale application of SCR on Solnhofen, Germany cement kiln

2006: Full scale "High Dust" SCR unit installed at Monselice, Italy cement kiln

2007: Full scale "High Dust" SCR unit installed at Sarche, Italy cement kiln

[79] Neelesh V. Sule, Ph.D, P.E., "Assessing Control Strategies for Ground-Level Ozone," (Texas Council of Governments, Nov. 5, 2013.

2010: Full scale "High Dust" SCR unit installed at Mergelstetten, Germany cement kiln

2011: Full scale "High Dust" SCR unit installed in Rohrdorf, Germany cement kiln

2015: Full scale "High Dust" SCR unit to be installed at Rezatto, Italy cement kiln

For control of smog-forming NOx pollution, there is no better technology for cement kilns in the world today than SCR. Cement plants using SCR report reductions from 80 to over 90%. Indeed, the Solnhofer, Germany plant reported an 80% removal rate for NOx pollution when it operated its SCR unit in the early part of this century.[80] The plant manager of the Monselice, Italy cement plant using SCR installed in 2006 has recorded a 95% removal rate of NOx pollution.[81] The Mergelstetten, Germany cement plant reports an 85% removal rate for NOx pollution from an SCR unit installed in 2010.[82] The Rohrdorf, Germany cement plant reports an 88-90% reduction in NOx pollution from an SCR unit installed in 2011.[83] At the Holcim-owned Joppa, Illinois long dry kiln where an EPA pilot project is currently being conducted, operators report an 80% removal rate for a retrofitted SCR system.[84] Holcim also has SCR experience of its cement plant in Mannersdorf, Germany that according to a recent interview with the plant manager "is capable of cutting smog-forming Nitrogen Oxides by around 90%. During the first year, the overall operating costs of the SCR in Mannersdorf were comparable to those of an SNCR."[85]

There is also the option of adding smaller SCR units to run in conjunction with the SNCR technology at the Midlothian plants, to produce so-called "hybrid systems." According to University of Texas at Arlington researchers who studied SCR-SNCR hybrids ("Hybrid Systems" January 2011, unpublished) the benefits of such an arrangement include:

- higher NOx removal compared to SNCR alone (and often SCR alone, as well)
- lower NH_3 slip compared to SNCR alone (improved efficiency of chemical utilization),
- downsized SCR catalyst bed, which means lower operation and maintenance costs compared to SCR alone, and easier retrofit,
- potential elimination of the SCR ammonia injection system,
- reduced SO_2 oxidation, which lessens risks associated with both ammonium bisulfate formation and plume opacity associate with SO_3.

Manufacturers of SCR agree with this assessment:

A recent progression in system design is the Hybrid SNCR/SCR system approach. By combining the two technologies, improvements can be seen in chemical and catalyst utilization, making the hybrid combination often more flexible and

[80] John Kline, "Is SCR Technology Coming (back) to Cement?", World Cement (Apr. 2013).
[81] *Id.*
[82] *Id.*
[83] *Id.*
[84] *Id.*
[85] Global Cement (Mar. 2014).

effective than the sum of its parts. A Hybrid system utilizes lower temperature SCNR injection to provide improved NOx reduction while generating higher ammonia slip. The residual ammonia slip is the reagent for a smaller SCR reactor that removes the slip and reduces NOx while limiting the costs associated with a larger catalyst volume.[86]

EPA has agreed with that assessment, noting that *"hybrid combinations of SNCR and SCR could be used in new cement kilns to achieve greater reductions than would be possible with SNCR alone."*[87]

Besides reducing NOx emissions by 80 to 90%, SCR has also been found to significantly cut smog-forming VOC emissions as well. Holcim's Mannersdorf, Germany using SCR "…is capable of reducing Total Hydrocarbons by around 98 - 99%."[88] The Cementeria di Monselice cement plant in Padova Province, Italy, has been operating an SCR system for almost ten years. In December 2006, the plant manager co-authored a report about the performance of the system, summarizing the environmental benefits that had been observed with its use, including 75% oxidation of VOC and elimination of "almost all ozone precursors (NOx and VOC)."[89] Those benefits included the effect on VOC removal efficiencies:

> *"In addition, 75 % oxidation of VOC is recorded. Almost all ozone precursors (NOX and VOC) can be eliminated from the stack emissions of Cementeria di Monselice with the installed SCR process."*

(3) A 2006 TCEQ Study Affirms the Technical and Economic Feasibility of Cement Kiln SCR

Mandated in 2005 by a court settlement with Downwinders at Risk, a blue-ribbon panel of five engineering and cement technology experts convened by the TCEQ studied the feasibility of a variety of cement plant control technologies, including SCR. The panel's final report, prepared by Eastern Research Group for TCEQ and published in July 2006 concluded, "SCR is an available technology for dry kilns," *i.e.* "commercially available and in use on similar types of cement plants" and "transferable technology," because it had been tested and implemented on a full-scale in Europe and had proven effective on similarly fired industrial and utility units in the U.S., like coal-fired power plants and waste incinerators.[90] There is no ambiguity in the final report's classification. For dry technology kilns, SCR was a commercially available technology

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[86] "NOx Emission Control: Emission Origins and Available Control Solutions," (http://www.durrenvironmental.com/NOXCS.asp.

[87] National Association of Clean Air Agencies, COMMENT ON PORTLAND CEMENT NSPS (2009).

[88] Global Cement (Mar. 2014).

[89] "High dust SCR solutions,", ELEX, Switzerland; Clemente Bellin, Cementeria di Monselice, Italy; AA Linero, PE, Tallahassee, Florida, International Cement Review, December 2006.

[90] ERG, Inc. ASSESSMENT OF NO_x EMISSIONS REDUCTION STRATEGIES FOR CEMENT KILNS - ELLIS COUNTY, FINAL REPORT, Cement Kiln Study for the Air Quality Planning Section Chief Engineer's Office, Texas Commission on Environmental Quality,, Appendix I, Tables 1-1 to 1-16 and Chapter 4.0, (July 14, 2006).

in 2005. All four of Midlothian's cement kilns, divided between its three plants, are dry technology.

The 2005 final report also concluded that SCR makes 80-85% reductions of smog-forming NOx possible and the cost is under $2000 per ton of NOx removed in dry kilns. This is far below the cost per ton of NOx removed ratio of other state-sponsored pollution control measures, including the up to $13,000 per ton removal ratio of the TCEQ's *Texas Emissions Reduction Plan, aimed primarily at mobile sources.* A similar program in California is paying for NOx reductions up to $14,300 per ton. The State of Wisconsin has published cost effectiveness guidelines for ICI units at up to $7000 per ton for its RACT, BART, and CAIR programs. In 2003, the State of Oklahoma developed cost effectiveness guidelines for the Central Oklahoma EAC at up to $10,000 per ton of NOx from Electric Generating Units. Clearly, SCR compares favorably with these other air pollution control options in terms of economic feasibility. Both tests for RACT and RACM were met by SCR in dry kilns in 2005. Moreover, in the ten years since TCEQ's study, at least four more full-scale SCR units operating on cement plants have been installed, providing additional support for the technical and economic feasibility of cement kiln SCR.

In the last several years, several major cement manufacturers and pollution control manufacturers have endorsed the use of SCR on cement kilns**.** In 2006 alone, CEMEX Cement, owners and operators 13 plants in the US, performed its own review of SCR technology as part of the permitting process for a new kiln at its Brooksville Florida plant, concluding that "two add-on NOx control technologies that have been proven effective by full scale application on cement plants are SNCR and SCR" and "SCR is an "available NOx control technology" for cement kilns."[91] Similarly, in a September 30, 2008 letter to EPA Administrator Stephen Johnson, Carolyn Slaughter of the Institute of Clean Air Companies, who represents the largest manufacturers of pollution control equipment, wrote:

> "Selective Catalytic Reduction (SCR) technology represents a mature NOx abatement technology and is an effective technology for reducing NOx emissions from cement kilns. While there is no domestic experience applying SCR on cement kiln there is a growing body of European experience.
>
> SCR can reduce NOx emissions from cement kilns by greater than 90 percent, which is consistent with the removal efficiencies achieved with SCR in the electricity generation industry. There are over 300 SCR systems installed on coal, oil and natural gas-fired utility boilers and there are many more applications of the technology in other industrial sectors such as nitric acid plants, steel sinter plants, waste incinerators, and refinery heaters.
>
> SCR catalysts have been proven to handle high levels of dust from coal combustion. SCR is reliable and durable under severe operating conditions. The typical operating temperatures for an SCR range from 500 to >950°F, which favor its use on cement kilns as the gas temperature between the rotary kiln and the

[91] APPLICATION FOR A PSD CONSTRUCTION PERMIT REVIEW, CEMEX, INC. Kiln 3 Project, Brooksville Cement Plant, Hernando County, Florida (Oct. 12, 2006).

stack are within this range. High temperatures in the rotary kiln create high concentrations of NOx, making SCR particularly suitable to removing significant levels of NOx as much as 90 percent or more."[92]

Perhaps the most compelling evidence that SCR is economically and technically feasible is that one of the Midlothian cement plants in DFW has *already* applied for a permit to build a full scale SCR unit on one of its two kilns. In fall 2014, Holcim applied, and TCEQ tentatively approved, a permit to build and operate a full-scale SCR unit in its Kiln #2.[93] Holcim's permit application to TCEQ for SCR demonstrates that the technology meets, and exceeds, every criterion established in federal law, for its inclusion in the 2015 DFW SIP.

Industry has decided SCR is an effective, economical and technologically feasible pollution control technology for cement kilns. Owners and operators of US and European cement plants agree. Indeed, the owner and operator of a cement plant regulated by the TCEQ, and located in the DFW nonattainment area, voluntarily chose to install SCR. The marketplace has spoken. For a state government that prides itself on listening to business, Texas seems deaf to industry on this matter.

(4) TCEQ's Analysis of SCR for Cement Kilns is Woefully Inadequate

TCEQ fails to evaluate let alone acknowledge SCR as a reasonably available control technology. The agency's only mention of SCR for cement kilns appears in its RACM analysis. Setting aside the agency's arbitrary failure to consider SCR as RACT, TCEQ's stated reasons for dismissing cement kiln SCR from its legally-required RACM analysis do not withstand scrutiny. Indeed, the agency mentions only three general reasons for rejecting SCR without any analysis or explanation. This is inadequate in light of TCEQ's obligation to "explain why the selected [attainment] implementation schedule is the *earliest* schedule based on the specific circumstances of that area," and provide "specific[] evidence of economic or technologic infeasibility" before rejecting RACT.[94]

At the outset, it is important to note that much of TCEQ's rationale for rejecting SCR as RACT is based on outdated, stale information, including one report that the agency misconstrues and another that was never supposed to be the final word on how RACT/RACM is interpreted for the North Texas cement industry in 2015. None of these sources constitute contemporary, or "grounded in evidence of economic or technologic infeasibility."[95]

All of TCEQ's objections to SCR as RACM on cement kilns can be traced back to a single seven-page section of the 172 page report titled "Applicability of SCR to Cement Kilns and Areas of Concern." TCEQ's selective citation of that report, however, is belied by the

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[92] *See* http://lyle.smu.edu/~aja/ICAC-SCR-Cement-2008.pdf.
[93] "TCEQ Air Quality New Source Review(NSR), PSD Permit Amendment Applications Supplement, Holcim (Texas) LP – Midlothian Plant, TCEQ Permit Number 8996, Modification PSDTX454M4.
[94] Mem. from John S. Seitz, director of EPA's Office of Air Quality Planning and Standards, to EPA regional air division directors (Nov. 2, 1999).
[95] ERG, ASSESSMENT OF NOx EMISSIONS REDUCTION STRATEGIES FOR CEMENT KILNS - ELLIS COUNTY FINAL REPORT TCEQ Contract No. 582-04-65589, Work Order No.05-06 (July 14, 2006).

remainder of the report, which actually concludes:

> The experience of coal-fired power plants and the one cement plant with SCR offers the following lessons. First, the success of coal-fired power plants shows that catalyst deactivation from alkali poisoning is not expected to be a significant problem for cement kiln applications. Second, the success of SCR systems on a number of coal-fired boilers reveals that even when flue gases have significant levels of both calcium oxide (CaO) and sulfur dioxide (SO_2), the condition can be handled in SCR systems without the occurrence of pore masking from calcium sulfate ($CaSO_4$) formation. Third, the power plant experience shows that SCR systems can be designed to achieve at least 85% NO_x reduction despite extremely large gas flow rates with significant NO_x variability and relatively high particulate loadings. Last, the power plant experience shows that equipment can be designed and operated such that the flue gas entering the SCR catalyst will always be in the proper temperature range. For wet kiln applications, this can lead to a requirement for significant gas re-heat.[96]

It's clear from this language at the end of listing potential problems with operating SCR units at cement plants that authors of the report never intended that list to be seen as insurmountable obstacles to the installation and successful operation, especially a decade later, when there are five more cement plants using SCR and all of these problems have been overcome.

TCEQ's reliance on EPA studies is unsurprisingly also misleading. At the outset, EPA proposed the cited review of Portland Cement Plant NSPS on June 16, 2008—nearly seven years ago. In relying on that outdated information, TCEQ once again ignores the best available information and demonstrated success of additional installation, operation, and EPA's exploration of SCR in additional cement plants. Indeed, EPA is conducting a successful test of SCR technology, the results of which are expected to be published this spring. Holcim reports an 80% removal rate for NOX via a retrofitted SCR system at its Joppa, Illinois long dry kiln, where EPA is overseeing the test.[97] Moreover, there are now twice as many cement plants using SCR than a decade ago.[98] All of them utilize full-scale "high dust" units, and thus the problems cited by EPA are no longer obstacles to further application. As discussed above, the planned installation of SCR at a Midlothian cement plant provides strong evidence that it is a technically

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[96] *Id*.

[97] TCEQ suggests the EPA Joppa Illinois pilot test results will arrive "too late to evaluate 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," even though the TCEQ states that report will be ready by the Spring of 2015 and does not have to submit the SIP to the EPA until July 15. In any event, there is no reason TCEQ must wait. Holcim owns both the Joppa Illinois site and the Midlothian cement plant, where the company has voluntarily applied for a permit to install SCR. That fact alone suggests the SCR has been successful, and that SCR is both economically and technologically feasible.

[98] What is most remarkable about TCEQ arguments concerning SCR on the Midlothian cement plants is its total disregard for recent developments in the cement industry. Since 2006, five new cement plants have installed and successfully operated full-scale SCR units, yet none of this practical experience is accounted for in TCEQ's RAM/RACT analysis. In just the last six months, a cement plant in Midlothian itself has applied for a permit to install and operate a full-scale SCR unit, and yet that too is completely ignored by TCEQ.

and economically feasible. Given that TCEQ has come to the very same conclusion, the agency must conduct a case-by-case RACT determination for the remaining Midlothian cement plants.[99]

Perhaps more importantly, the EPA rule TCEQ cites was primarily concerned with setting national toxic emissions standards for cement plants, not defining RACM/RACT control strategies for cement plants in ozone non-attainment areas.[100] The EPA's reluctance to set a uniform national NOx removal standard requiring SCR was because of doubts about its application in *all* parts of the country. But the DFW SIP does not require a single control technology to be applied uniformly across the nation, or even the state. It does, however, require TCEQ to identify and implement reasonably available control measures and technology that are technologically and economically feasible.[101] This standard requires TCEQ to make case-by-case, or source-by-source RACM determinations for cement kilns in the DFW nonattainment area. In failing to do so, TCEQ ignores the plain requirements and spirit of the Clean Air Act.

(5) SCR is RACT for Cement Kilns; Alternatively, TCEQ Has an Obligation to Implement SCR as RACM

There is no serious dispute that SCR for cement kilns is the "toughest control considering technological and economic feasibility that can be applied" to some of the single largest sources of smog-forming pollution in the DFW non-attainment area. It is technologically and economically feasible. Consequently, TCEQ is required to implement SCR for cement kilns in the DFW nonattainment area as expeditiously as practicable. TCEQ's failure to do so contravenes the Clean Air Act and renders the DFW AD SIP unlawful.

Even if SCR was not RACT (which it is), the technology qualifies as RACM for cement kilns. Indeed, there is no dispute that SCR for cement kilns could help speed compliance with the 75 ppb standard if applied now. As a result, TCEQ must implement SCRs for cement kilns.

In one last attempt to justify its rejection of SCR as a RACM for the DFW nonattainment area, TCEQ asserts that any RACM/RACT technology has to be up and running by the summer of 2017 in order to accelerate attainment of the 75 ppb standard *at least one year* before the 2018 federal deadline. As an initial matter, this explanation does not and cannot justify the agency's failure to implement RACT for sources contributing to nonattainment.[102] As discussed above, and as TCEQ has recognized, "[a]dvancing attainment of the area is not a factor of consideration when evaluating RACT because the benefit of implementing RACT is presumed under the

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[99] Further, in rejecting SCR, TCEQ is ignores 14 years of successful SCR operation in the European cement industry. There is nothing in EPA's RACT/RACM language that says a proven technology must be installed and operated successful on US soil to be considered technically or economically feasible. Some of the same companies successfully operate SCR units in Europe own cement plants in the US as well. The knowledge to apply the technology is transnational. The same thing is true when TCEQ claims "the use of hybrid SCR-SNCR has not been demonstrated at any U.S. cement plant." To be classified as RACM or RACT, it does not necessarily have to be demonstrated at any U.S. plant.

[100] 75 Fed. Reg. 54970 (Sept. 9, 2010)

[101] TCEQ, 2015 DFW AD SIP, APPENDIX G REASONABLY AVAILABLE CONTROL MEASURE ANALYSIS at 5.

[102] *See* 42 U.S.C. § 7502(c)(1).

FCAA."[103] Nothing in the Clean Air Act or EPA's guidance supports rejecting RACT because it cannot be installed and operational in sufficient time to advance attainment by more than one year.

While EPA has interpreted *RACM* to apply only where it *can* advance attainment by one year, nothing EPA's interpretation or the Clean Air Act suggests that a measure fails to qualify as RACM if it cannot be installed and operation an entire year before the attainment date. The control measure should only be capable of advancing attainment by one year. It is undisputed that SCR technology, in general, is capable of advancing attainment by one year. Given that TCEQ admits that it cannot and will not attain by 2018, TCEQ's reliance on an arbitrary 2017 cutoff date for RACM is unreasonable. Such a cramped interpretation of RACM would discourage the use of the most effective measures for reducing NOx from point sources.

In any event, it is not too late to make a decision that SCR is RACM for the Midlothian cement plants. It is clear from its own sensitivity runs that the application of SCR on the cement plants would hasten the 2018 attainment date, and would provide assurance that attainment could be met at all once the deadline arrives.[104] Two years is sufficient time for the Midlothian cement plants to contract and build SCR units on their kilns, and be operational by summer 2017. There is nothing in the record to suggest otherwise. As a result, the purported inability to advance attainment by one year fails the test outlined in the EPA's Seitz Memorandum:

The Clean Air Act requires TCEQ to implement all reasonably available control measures, including RACT for nonattainment areas. There is no dispute that SCR is "the lowest emissions limit" that cement kilns are "capable of meeting."[105] Moreover, the record demonstrates that SCR for cement kilns is both technologically and economically feasible. TCEQ fails to explain, on a source-by-source basis, why SCR is not RACT for cement kilns.[106] Consequently, TCEQ's SIP is unlawful. TCEQ must implement SCTR as RACT for cement kilns in the DFW area "as expeditiously as practicable."[107]

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[103] TCEQ, APPENDIX A: REASONABLY AVAILABLE CONTROL TECHNOLOGY ANALYSIS. HOUSTON – GALVESTON - BRAZORIA REASONABLY AVAILABLE CONTROL TECHNOLOGY ANALYSIS UPDATE, STATE IMPLEMENTATION PLAN REVISION FOR THE 1997 EIGHT-HOUR OZONE STANDARD Project No. 2010 028-SIP-NR, (2011).

[104] Memo from Edward Tai and Greg Yarwood to Pete Breitenbach Re: Task 19, DFW APCA Run for 2009 with East Texas EGU Controls, Environ (June 22, 2006), attached as Ex. 1 [hereinafter Environ Modeling]. The entire modeling report is also attached as Ex. 2a-d

[105] COMAR 26.11.01.01.B(40); accord U.S. EPA, State Implementation Plans; Nitrogen Oxides Supplement to the
General Preamble for the Implementation of Title I of the Clean Air Act Amendments of 1990, 57 Fed. Reg. 55,620,
55,624 (Nov. 25, 1992).

[106] Mem. from John S. Seitz, director of EPA's Office of Air Quality Planning and Standards, to EPA regional air division directors (Nov. 2, 1999).

[107] 42 U.S. § 7502(c)(1).

C. TCEQ Should Implement SCR as RACM for Coal-Fired Electric Generation Units in Central and East Texas

As noted above, each nonattainment state implementation plan "*shall provide for the implementation of all reasonably available control measures as expeditiously as practicable* (including such reductions in emissions from existing sources in the area as may be obtained through the adoption, at a minimum, of reasonably available control technology) and shall provide for attainment of the national primary ambient air quality standards."[108]

EPA has defined RACM as any potential control measure for application to point, area, on-road and non-road emission source categories that is: (1) technologically feasible; (2) economically feasible; (3) does not cause "substantial widespread and long-term adverse impacts"; (4) is not "absurd, unenforceable, or impracticable"; and (5) can advance the attainment date by at least one year.[109] As discussed more fully below, applying these factors to northern and eastern Texas coal-fired EGUs on a source-by-source basis makes clear that SCR is a reasonably available control measure for many, if not all, coal fired EGUs that contribute to the DFW area's nonattainment.

(1) TCEQ Must Re-evaluate and Implement SCR as RACM for Coal-Fired EGUs that Contribute to DFW's Continued Nonattainment

As an initial matter, TCEQ takes a narrow view of the Clean Air Act's mandate to implement "all reasonably available control measures as expeditiously as practicable."[110] In the agency's view, section 172(c)(1) does not require consideration or implementation of RACM for sources *outside* the designated DFW nonattainment area, but which nevertheless contribute to the area's continued nonattainment.[111] That interpretation, however, is inconsistent with the plain language and purpose of the statute.[112]

Although the state may limit its RACT analysis to "existing sources *in the area*," that qualification applies only to language within the parenthetical. Moreover, section 172(c)(1)'s use of the term "including" suggests that RACT is a discrete species of RACM, which is limited to "existing sources in the area."[113] The phrase "reasonably available control measures," by contrast, has no such geographical limitation. Indeed, the Clean Air Act's mandate to implement "*all* reasonably available control measures" suggests RACM should be interpreted broadly, so as to apply to any measures that may advance attainment, regardless of whether the source of

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[108] *Id*.
[109] 74 Fed. Reg. 2945 (Jan. 16, 2009).
[110] 42 U.S.C. § 172(c)(1).
[111] TCEQ, AD SIP, App'x G, Reasonably Available Conrol Measure Analysis at 1.
[112] *Chevron, U.S.A., Inc. v. Natural Res. Def. Council, Inc.*, 467 U.S. 837, 842 (1984) (although a court will defer to an agency's reasoned interpretation of an ambiguous statutory provision the agency is charged with implementing, "If the intent of Congress is clear, ... the court, as well as the agency, must give effect to the unambiguously expressed intent of Congress.").
[113] 42 U.S.C. § 7502(c)(1) (emphasis added).

pollution is within the designated area.[114] Indeed, EPA's interpretations of RACM suggest that those measures are not limited geographically, but limited only insofar as they are able to advance attainment.[115] This interpretation is also consistent with section 172(c)(1)'s goal of providing for attainment as expeditiously as practicable.

As discussed more fully below, there is no dispute that NOx emissions from Texas coal-fired EGUs contribute to ozone nonattainment in the DFW area. Moreover, by reducing those emissions to the levels achievable with reasonably available control technology, TCEQ could ensure the DFW area's compliance with the 2008 ozone NAAQS far more expeditiously, more economically, and more equitably than under the agency's do-nothing approach. Because SCR for Texas coal-fired EGUs contributing to DFW nonattainment is a reasonably available control measure, TCEQ must re-evaluate those sources and implement SCR where technologically and economically feasible.

Where, as here, the agency voluntarily engages in an analysis of RACM for sources outside the nonattainment area, it must still provide a reasoned explanation for its decision.[116] Here, TCEQ devoted less than a page and a half to its analysis of reasonably control measures for coal-fired EGUs outside the DFW area. The agency concluded, without providing any real analysis or explanation, that neither SCR nor selective non-catalytic reduction technology was justified. In so doing, the agency significantly underestimated the NOx reductions that can be achieved through the application of SCR, and greatly overestimated the cost. Indeed, the agency provided no support whatsoever for its assertion that SCR would cost nearly $8 billion to implement. Moreover, given that the economic feasibility of a control measure is a source-specific inquiry, that turns on the application of a particular control technology to a particular source, TCEQ's conclusory rejection of SCR each and every one of the 69 point sources outside the DFW area on the basis of overall cost was arbitrary and contrary to EPA guidance.[117] The regulatory question at hand is not the cost of applying a control technology willy-nilly to dozens of sources across the state, but rather whether there are individual sources or groups of sources for which there is reasonably available control technology at costs that are cost-effective upon whose application ozone concentrations in DFW can be reduced and reduced more quickly to attain clean air.

The agency compounded its error in dismissing SCR for power plants by failing to make any attempt to quantity the ozone improvements for the DFW area that would result from the implementation of SCR, or to compare the cost of such controls to the costs borne by the public as a result of more stringent vehicle emission standards, or the costs of compliance with the

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[114] *Cf. Ali v. Fed. Bureau of Prisons*, 552 U.S. 214, 220-21 (2008) (recognizing that Congress's use of terms like "any" or "all" modify the language that follows, and is most naturally read to apply "without limitation.").

[115] 74 Fed. Reg. 2945 (Jan. 16, 2009); see also Final Rule to Implement the 8-Hour Ozone National Ambient Air Quality Standard—Phase 2, 70 Fed. Reg. 71,612 at 71,616, 71,632 (explaining that states may consider emissions reductions from outside the nonattainment area up to 200 km for NOx; such reductions "must be shown to be beneficial toward reducing ozone").

[116] *See e.g.*, *Motor Vehicle Mfrs. Ass'n of the United States v. State Farm Mut. Auto. Insurance Co*., 463 U.S. 29, 42-43 (1983).

[117] 57 Fed. Reg. at 18,074.

Cross-State Air Pollution Rule.

TCEQ's superficial and cursory analysis cannot be deemed reasoned decision-making, and therefore cannot be approved by EPA. Indeed, in approving any state implementation plan under the Clean Air Act, EPA "must examine the relevant data and articulate a satisfactory explanation for its action including a *rational connection between the facts found and the choice mad*e."[118] EPA's approval of a SIP is "arbitrary and capricious if the agency has relied on factors which Congress has not intended it to consider, entirely failed to consider an important aspect of the problem, offered an explanation for its decision that runs counter to the evidence before the agency, or is so implausible that it could not be ascribed to a difference in view or the product of agency expertise."[119]

Moreover, EPA may not supply a reasoned basis for the agency's action that the agency itself has not given. In order for the EPA to determine whether an area has provided for implementation as expeditiously as practicable, "the State must explain why the selected implementation schedule is the earliest schedule based on the specific circumstances of that area. Such claims cannot be general claims that more time is needed but rather should be specifically grounded in evidence of economic or technologic infeasibility."[120] Thus, even if (as TCEQ contends) the agency is not legally obligated under the Clean Air Act to consider RACM for contributing point sources outside the nonattainment area, TCEQ must still re-evaluate all reasonably available control measures for Texas coal plants, and provide a rational explanation for rejecting SCR as RACM for coal-fired EGUs outside the DFW nonattainment area.[121]

(1)Texas Coal Plants Outside the DFW Nonattainment Area are Significant Contributors to the State's Unsafe Ozone Levels

Texas's coal plants and cement kilns are the State's largest individual sources of the ozone precursor, nitrogen oxides ("NOx"). Coal plants by themselves account for 9.5% of the State's overall annual NOx emissions.[122]

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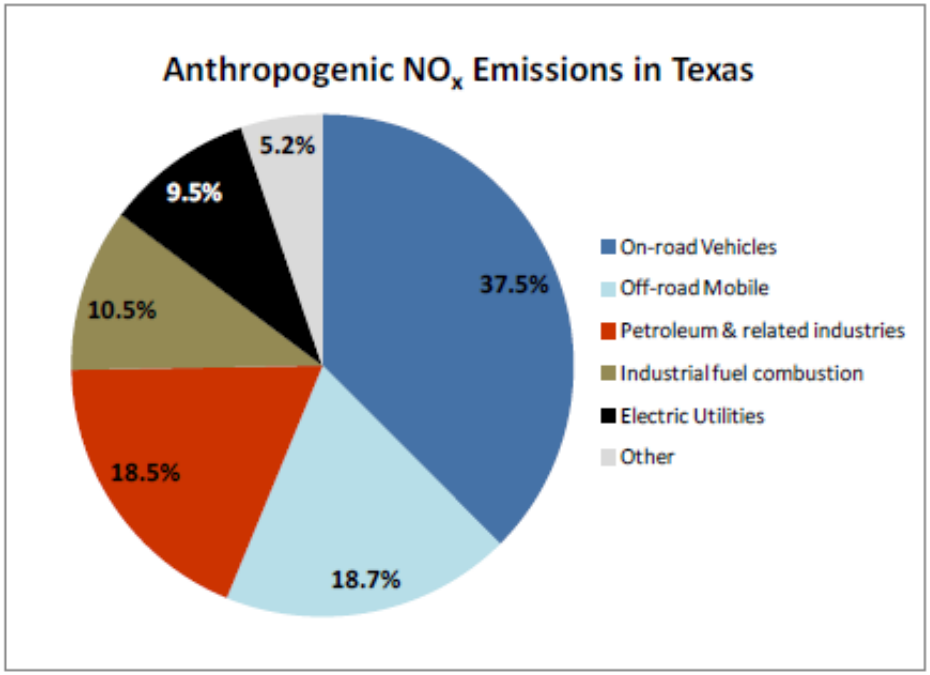
[118] *State Farm*, 463 U.S. at 43 (citation and quotation marks omitted; emphasis added).
[119] *Id*.
[120] Mem. from John S. Seitz, director of EPA's Office of Air Quality Planning and Standards, to EPA regional air division directors (Nov. 2, 1999).
[121] *Ne. Md. Waste Disposal Auth. v. E.P.A.*, 358 F.3d 936, 949 (D.C.Cir.2004) (noting the "fundamental requirement of nonarbitrary administrative decisionmaking: that an agency set forth the reasons for its actions"). Furthermore, "an agency's action must be upheld, if at all, on the basis articulated by the agency itself," *State Farm*, 463 U.S. at 50, 103 S.Ct. 2856, and a court "may not supply a reasoned basis for the agency's action that the agency itself has not given," *id.* at 43, 103 S.Ct. 2856 (internal quotation marks omitted).
[122] EPA 2011 National Emissions Inventory. According to TCEQ, non-DFW EGUs contribute 3.5%, or 4.49 ppb, ozone to the Denton Airport South monitor. TCEQ DFW AD SIP, App'x C, Photochemical Modeling for the Dallas Fort Worth Attainment Demonstration State Implementation Plan Revision for the 2008 Eight-Hour Ozone Standard at C-101



Since ozone is not emitted directly, reductions in ozone must be achieved by controlling one or both of its precursor gases: nitrogen oxides ("NOx") and volatile organic compounds ("VOCs"). Most studies show that ozone in most of Texas, including the Dallas-Fort Worth region and urban and rural regions of central and eastern Texas, is controlled most effectively by reducing emissions of NOx, although in some areas and under certain conditions emissions of VOCs can also drive ozone formation.[123] Technology such as selective catalytic reduction has enabled point sources to emit far less of the nitrogen oxides that form ozone.

As the Texas Council on Environmental Quality points out in its proposed rule, coal-fired plants in northern and eastern Texas are plants are subject to the 14-year old and much more modest attempts to control NOx emissions that were included in 30 TAC Chapter 117 as part of the DFW attainment demonstration for the 1997 eight-hour ozone standard adopted on April 19, 2000.[124] These standards, however, were implemented to ensure compliance with the 1997 ozone standard, which the Dallas-Fort Worth area still fails to meet.

Further, only eight out of 38 coal-fired power plant boilers in Texas are equipped with readily available selective catalytic reduction ("SCR") controls. Of the subset of seven coal-fired power plants most directly impacting DFW air quality, none are equipped with SCR.[125] Although only a small number of coal-fired power plant boilers in Texas are currently equipped with SCR, the ones that do have the technology span both lignite (e.g. the Sandow Unit 4 boiler near Rockdale) and PRB (e.g. the Parish Units 5, 6, 7, and 8 near Houston) types of coal, the two

[123] Kim, S., D.S. Cohan, and D.W. Byun, Contributions of inter- and intra-state emissions to ozone over Dallas-Fort Worth, Texas. *Civil Engineering and Environmental Systems*, 2009. 26: p. 103-116.
[124] AD App'x G, Reasonably Available Control Measure Analysis at 8.
[125]

kinds of coal fired in large quantity in Texas. These plants achieve much lower NOx emission rates than the non-SCR equipped units in the state.

The Texas power plants without modern NOx controls are equipped with technology generally originating in the 1960's and 1970's such as low NOx burners, over-fire air, selective non-catalytic reduction ("SNCR") or similar technology, which are much less effective at controlling NOx emissions than SCRs. The differences in these controls' effectiveness are borne out by the data: The most poorly controlled coal units in Texas emit NOx at rates 5 times those of the best controlled coal plants.[126] As a consequence, on peak ozone days, the most poorly controlled units in Texas are among the largest contributors of ozone precursors. Consequently, reducing NOx emissions from these facilities, especially on the dates of highest energy demand and the highest potential for ozone formation will have large ameliorative effects on air quality in Texas.

(2) A Case-By-Case Analysis of Point Sources Outside the DFW Nonattainment Area Reveals that SCR is RACM for Coal-Fired EGUs in East Texas

As noted above, TCEQ devoted less than a page and a half to its analysis of reasonably control measures for coal-fired EGUs outside the DFW area. The agency concluded that 69 point sources could be affected: 18 coal fired boilers, 19 gas-fired boilers, and 32 gas turbines. Without any analysis or support, the agency concluded that imposing SCR on each of these sources would cost $7,979,976,640, and that additional emission controls on these sources was not justified by the cost. The agency failed, however, to conduct a source-specific analysis of the largest sources of NOx outside the DFW area, and the costs and benefits of imposing SCR on those sources. At the same time, TCEQ substantially underestimated the likely emissions reductions associated with SCR on those facilities. In so doing, TCEQ substantially overestimated the cost of SCR, skewing the cost-benefit analysis. A proper case-by-case analysis of contributing point sources outside the DFW area reveals that SCR is RACM for the largest sources of NOx—coal-fired boilers within 200 km of the DFW nonattainment area.

a. SCR Will Advance Attainment Far More Expeditiously than TCEQ's Do-Nothing Approach, and is Capable of Advancing Attainment by a Year or More

As discussed above, supra Section ___, nothing EPA's interpretation or the Clean Air Act requires TCEQ to discard a technologically and economically feasible control measure simply because it cannot be installed and operation an *entire* year before the attainment date. As the Clean Air Act explicitly provides, the goal of RACM is attainment, and the control measure need only be *capable* of advancing that goal to be considered reasonably available. As discussed more fully below, SCR certainly satisfies that requirement. Indeed, the installation of SCR on Texas coal-fired EGUs could ensure attainment by 2018.

Source-apportioned modeling demonstrates that the installation of SCR on 17 coal-fired EGUs in eastern Texas—all within 200 km of the DFW nonattainment area—would significantly

[126] The installation of SCR at the W.A. Parish power plant near Sugarland was an important component of ozone attainment plans for Houston.

reduce NOx emissions, and thereby dramatically reduce ozone levels in the DFW area.[127] Indeed, installation of SCR on the 17 coal fired EGU boilers at Martin Lake, Monticello, Limestone, Welsh, Big Brown, Pirkey, Sandow, and Gibbons Creek—would all but ensure attainment of the NAAQS in DFW. For the lignite-burning facilities in east Texas, the model assumed that SCR would reduce NOx emissions to 0.08 lbs/MMBtu. For other coal, the model assumed SCR would reduce emissions to 0.05 MMBtu.[128] The results were dramatic, with a total NOx emission reduction of 137 tpd, of which 59% occurred in northern Texas and 35% in centra Texas. The Texas EGUs were separated into 13 emission groups. The first nine groups consisted of the nine highest-emitting EGUs in East Texas, which accounted for 85 % (117 tpd) of the total NOx reduction. The remaining Texas EGUs were separated into four groups: EGUs inside the DFW 9-county NAA, EGUs within 100 km of DFW (and outside the DFW NAA), EGUs within 200km of DFW (but outside 100 km), and all other Texas EGUs. The table below summarizes the weekday NOx for each EGU group and Figure 2 plots the change in weekday NOx from the EGU controls, color-coded by emissions group.

	NOx [tpd]	**Change from baseline [tpd]**	**Change [%]**
Martin Lake	24.1	-23.4	-49%
Monticello	18.1	-21.9	-55%
Limestone	15.2	-23.5	-61%
Welsh	8.3	-21.6	-72%
Big Brown	11.5	-9.1	-44%
Pirkey	6.6	-7.4	-53%
Sandow	4.3	-6.0	-58%
TK Gibbons Cr	2.5	-4.3	-63%
TNP One	6.6	0.0	0%
DFW 9-County EGUs	7.3	-2.0	-22%
EGUs within 100km	6.9	-6.6	-49%
EGUs within 200 km	9.7	-11.5	-54%
Other TX EGUs	264.4	0.0	0%

[127] Tai et al., Task 19, DFW APCA Run for 2009 with East Texas EGU Controls, Environ (June 22, 2006), attached as Ex. 1 [hereinafter Environ Modeling]. The entire modeling report is also attached as Ex. 2a-d

[128] The model also assumed that gas-fired EGU NOx emissions could be reduced to 0.03 lbs/MMBtu. *Id.* at 1.

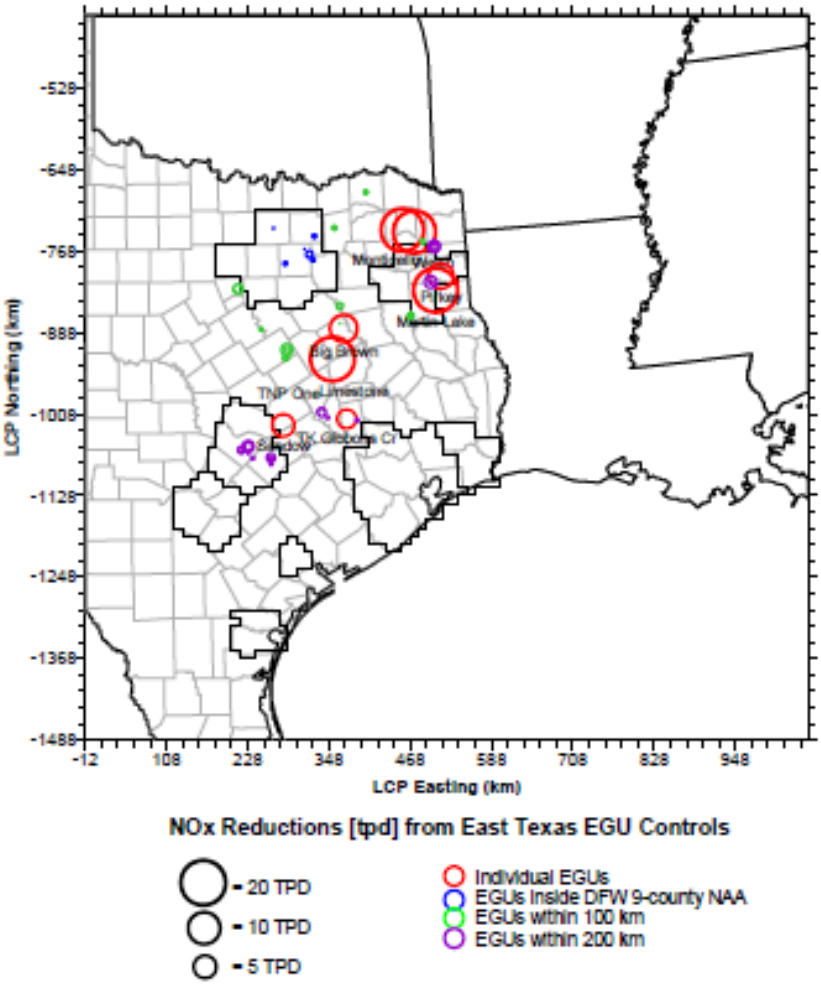
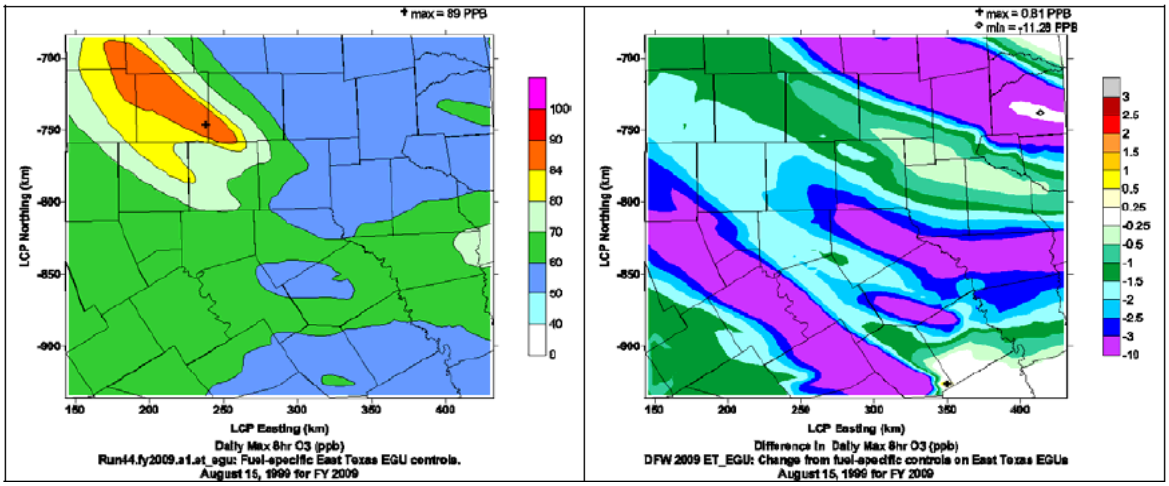
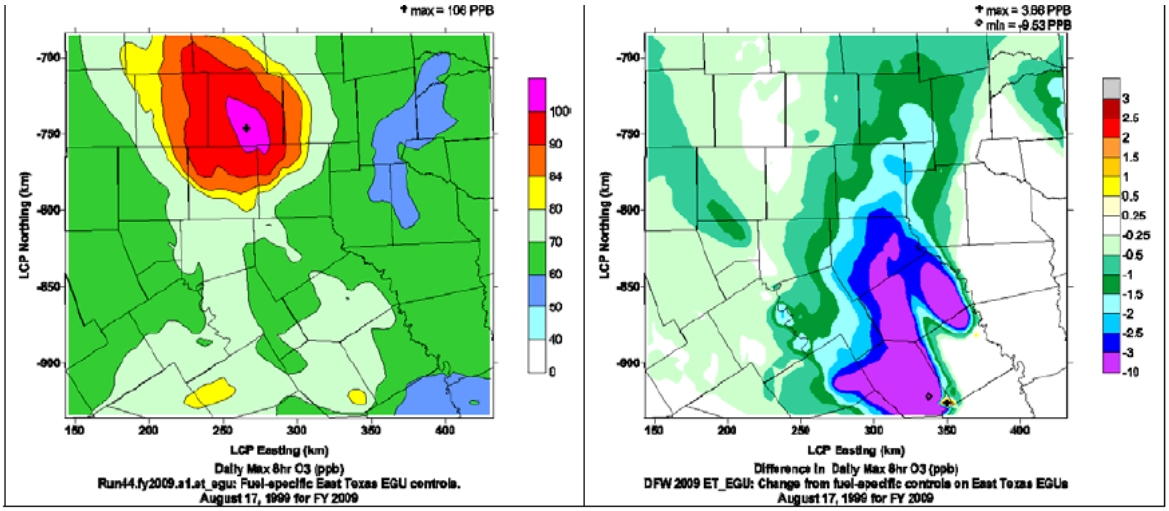


Figure 2: Change in Weekday NOx Emissions from East Texas EGUs with SCR

As the modeling makes clear, the application of SCR at the coal-fired EGUs in central and eastern Texas would result in considerable reductions of ozone in the DFW area. DFW monitors in the south (Midlothian and Arlington) showed the greatest reduction in the 2009 8-hour ozone design values, dropping 1.5 and 1.0 ppb, respectively. The future design values at all other monitors were reduced 0.5 to 0.8 ppb from the 2009 baseline, including Frisco, down 0.8 ppb to 90.5 ppb. The East Texas EGU controls reduced the ozone episode exceedance area by 6 %, as 17 % of the exceedance cells were reduced at least 1 ppb. As demonstrated below, the modeling indicated that on dates with an east wind (e.g., the August 15), the DFW 9-county NAA was surrounded by a plume of ozone reduction in northern DFW with origins near the Monticello and Welsh EGUs, and a plume in southern DFW with origins near the Pirkey and Martin Lake EGUs.

On dates with a south wind (particularly August 17), ozone reduction was strongest in southern DFW, mainly due to the NOx controls at the Big Brown and Limestone EGUs. *See* below.





The Environ modeling demonstrates that the installation of modern NOx controls at the eastern Texas coal-fired EGUs. Indeed, SCR at DFW-area coal-fired EGUs and cement kilns is capable of reducing the future design values in the DFW nonattainment area by as much as 2 ppb. Given that TCEQ admits that several of its DFW monitors will be as much as.5 ppb above the NAAQS in 2018, the implementation of SCR as RACM would have demonstrable benefits for DFW ozone levels, and would ensure timely attainment of the 2008 eight-hour standard.

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As discussed above, TCEQ's interpretation of EPA's RACM guidance to preclude measures that cannot be installed before 2017 produces absurd results and thwarts the purposes of the Clean Air Act. Indeed, TCEQ's discourages the use of the most effective measures for reducing NOx from point sources, thereby delaying attainment of the NAAQS. Moreover, it provides states like Texas with a convenient excuse for doing nothing. Given that the Clean Air Act requires states to demonstrate attainment with the NAAQS *as expeditiously as practicable*, TCEQ's cursory consideration and rejection of reasonably available control measures that will indisputably advance (and possibly ensure) attainment is unreasonable. This is especially so in light of the agency's admission that DFW will not otherwise meet the NAAQS.

In any event, it is not too late to make source-by-source decisions that SCR is RACM coal-fired EGUs in east Texas. Two years is sufficient time to contract and build SCR units, and be operational in 2017. In finalizing its Cross-State Air Pollution Rule, EPA indicated that 24-30 months was sufficient time for affected sources to install SCR.

b. SCR is Widely Available for Coal Plants, and SCR-Equipped Facilities Are Readily Capable of Achieving 90% Emission Reductions and Emission Rates as Low as 0.08 lbs NOx/MMbtu or Lower

SCR is far more than reasonably available—it is *actually* available and in operation on half of the country's mid- to large-size coal-fired EGUs. At least 47 percent of the nation's active coal units larger than 150 MW are equipped with SCR. When units that have announced an intention to retire are excluded from the list, the percentage of units over 150 MW with SCR or with plans to install SCR rises to nearly 52 percent. As such, SCR is actually *the most prevalent* NOx control for coal combustion in the United States.

In Texas, eight of the state's 38 coal-fired boilers 150 MW or larger have installed or announced plans to install SCR. SCR is capable of high rates of NOx removal. Contrary to TCEQ's overly conservative estimate SCR is capable of only 80% NOx reduction, SCR systems maintained consistent with good operating procedures can regularly ensure NOx emission reductions of 90% or more.[129] This translates to emission limits as low as 0.05 lbs/MMBtu or lower, such that a 0.07 lbs/MMBtu rate is consistently achievable on 30-day averages. Nor are such emission reductions theoretical. As demonstrated in the table below, the Texas EGUs that actually install and operate their SCR systems have achieved very high rates of NOx removal.

[129] EPA, Air Pollution Control Technology Fact Sheet, EPA-452/F-03-032, http://www.epa.gov/ttncatc1/dir1/fscr.pdf; Institute of Clean Air Companies (ICAC). Selective Catalytic Reduction (SCR) Control of NOx Emissions, Prepared by the ICAC SCR Committee, November 1997; EPA, Cost of Selective Catalytic Reduction (SCR) Application for NOx Control on Coal-Fired Boilers, EPA/600/R-01/087 (Oct. 2001), *available at* http://nepis.epa.gov/Adobe/PDF/2000CYYO.pdf; U.S. Dep't of Energy, Demonstration of Selective Catalytic Reduction Technology to Control Nitrogen Oxide Emissions From High-Sulfur, Coal-Fired Boilers: A DOE Assessment (Aug. 1998), *available at* http://www.netl.doe.gov/File%20Library/Research/Coal/major%20demonstrations/cctdp/Round2/scrfinl.pdf.

Table 1: 2010-2014 Lowest Monthly NOx Emission Rates from Large Texas Coal Plants Within 200 km of DFW Nonattainment Area (not including monthly operating times less than 400) [130]

Facility Name	Unit	MW	Year	Month	SCR	Avg. NOx Rate (lb/MMBtu)	NOx (tons)	Heat Input (MMBtu)	Operating Time
Big Brown	1	593.4	2012	1	No	0.1199	104.886	1792195	465.81
Big Brown	2	593.4	2014	4	No	0.1225	143.482	2316450	526.16
Gibbons Creek Steam Electric Station	1	493.5	2012	5	No	0.1131	85.961	1506575	486.13
H W Pirkey Power Plant	1	721	2014	12	No	0.1489	356.916	4796887	743.95
J K Spruce	**1	566	2012	7	No	0.1152	257.017	4452860	744
J K Spruce	**2	878	2012	8	Yes	0.0373	104.31	5601671	744
Limestone	1	893	2012	2	No	0.1624	405.723	4924037	696
Limestone	2	956	2012	1	No	0.1827	532.891	5806646	744
Martin Lake	1	793.2	2012	7	No	0.1489	350.36	4767233	714.87
Martin Lake	2	793.2	2012	9	No	0.1346	320.635	4781337	720
Martin Lake	3	793.2	2012	7	No	0.1338	326.769	4965687	717.7
Monticello	1	593.4	2012	1	No	0.106	96.354	1888709	477.53
Monticello	2	593.4	2013	9	No	0.1131	210.276	3818453	716.72
Monticello	3	793.2	2014	6	No	0.1278	201.797	2977263	609.73
Oak Grove	1	916.8	2012	1	Yes	0.0648	131.684	4001604	551.88
Oak Grove	2	878.6	2012	1	Yes	0.0586	175.991	5955219	743.3
Sandow Station	5A	661.5	2013	3	No	0.0605	63.542	2099951	744
Sandow Station	5B		2012	6	No	0.0612	63.299	2070390	720
Welsh Power Plant	1	558	2014	6	No	0.1699	252.14	2911500	705.35
Welsh Power Plant	2	558	2014	1	No	0.1517	185.64	2376352	731.08
Welsh Power Plant	3	558	2013	10	No	0.1712	241.303	2730191	688.25
WA Parish	5	734.1	2011	8	Yes	0.0422	97.18	4615332	744
WA Parish	6	734.1	2010	11	Yes	0.0492	81.932	3356456	720

[130] Data taken from U.S. Air Markets Database, *available at* http://ampd.epa.gov/ampd/.

WA Parish	7	614.6	2010	3	Yes	0.0398	66.159	3320280	744
WA Parish	8	654	2010	5	Yes	0.0399	72.929	3702456	741.9

As indicated above, the Texas coal plants equipped with SCR have historically achieved 30-day periods with average NOx emission rates lower than 0.08 lbs/MMBtu, as assumed in the Environ discussed above. In fact, some have emitted at even *lower* rates—as low as 0.0373 lbs/MMBtu. Plainly, the actual experience of SCR in Texas is that, when facilities operate the controls, very low levels of NOx emissions are the result. Indeed, Texas itself has recognized that coal-fired EGUs equipped with SCR are capable of dramatic reductions in NOx. The installation of SCR at the W.A. Parish power plant was an important component of the ozone attainment plan for the Houston area. Indeed, as shown above, SCR can reduce NOx emissions by up to 90% to a floor of .0398 lbs/MMBtu on a 30-day rolling average.[131] Accordingly, a RACM determination of no higher than 0.07 lbs/MMbtu for coal-fired EGUs in Texas is well-supported by this and other Texas coal-burning EGUs' actual historical experience.

c. SCR is Cost-Effective and TCEQ's Analysis of Costs Fails to Properly Evaluate the Costs and Benefits of SCR on a Unit-by-Unit Basis

Moreover, such rates of NOx removal can be achieved at very low cost—far below the costs predicted by TCEQ—and within the range that TCEQ has suggested is acceptable for NAAQS compliance. As EPA has indicated, SCR controls can eliminate NOx emissions at a cost of between $1,550 and $2,066 per ton.[132] Similar assessments exist for specific facilities: a removal rate of $1,583 to $2,297 per ton for the Gerard Gentleman facility in Nebraska,[133] $1,504 per ton for the Big Stone Generating Station in South Dakota,[134] $1,738 per ton for the Jeffrey Energy Center in Kansas, $2,240 per ton for the Navajo facility in Arizona,[135] and $2,405 per ton for Arizona's Coronado facility.[136] Each of these estimates is far less expensive than the $3,300 per ton cost-effectiveness ration that TCEQ itself has suggested is reasonable to ensure compliance with the NAAQS.[137] Thus, in addition to being technologically feasible, emission limits consistent with SCR operation are also quite economically feasible.

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[131] US-EPA, EPA's Integrated Planning Model Base Case v.4.10 2010; see also Cohan, Addressing Pollution from Legacy Coal Power Plants in Texas (July 2013), attached as Ex. 3.
[132] U.S. EPA, Menu of Control Measures, http://www.epa.gov/air/pdfs/MenuOfControlMeasures.pdf.
[133] *See* 77 Fed. Reg. 40,151 (July 6, 2012); 77 Fed. Reg. 12,770 (March 2, 2012).
[134] *See* 76 Fed. Reg. 80,754 (Dec. 27, 2011); 76 Fed. Reg. 52,604 (Aug. 23, 2011).
[135] *See* 78 Fed. Reg. 8,273 (Feb. 5, 2013).
[136] *See* 77 Fed. Reg. 72,511 (Dec. 5, 2012); 77 Fed. Reg. 42,834 (July 20, 2012).
[137]Texas Natural Resource Conservation Comm', Response to Comments, Chapter 117-Control of Air Pollution from Nitrogen Compounds, Rules Log No. 99056-117-AI (BPA) and 99055d117-AI(DFW) at 67, *available at* https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&cad=rja&uact=8&ved=0CCsQFjAC&url=http%3A%2F%2Fwww.tceq.state.tx.us%2Fassets%2Fpublic%2Flegal%2Frules%2Fhist_rules%2FComplete.99s%2F99056117%2F99056117_ado.pdf&ei=nEjbVL_sAondoASMoIKIDg&usg=AFQjCNGB6VeQuJ6vgSDVY2SdqmXnzKq6fQ&sig2=jqUAq_bKMnT7Yp4z-zYH2Q&bvm=bv.85761416,d.cGU.

d. Requiring Coal-Fired EGU's to Install SCR is More Equitable than Requiring Texas Consumers and Taxpayers to Bear the Cost of NOx Emissions Reductions

Rather than fully evaluating and requiring reasonably available control measures for large sources of NOx that contribute significantly to the DFW area's nonattainment, TCEQ chose instead to rely on largely unenforceable, anticipated emissions reductions stemming from state and federal vehicle fuel standards, vehicle and energy efficiency incentives, and other measures designed to reduce NOx emissions through consumer fuel and energy efficiency. As one example, TCEQ cites the Diesel Emissions Reduction Incentive ("DERI") Program, under which $943 million in grants have been awarded for projects projected to help reduce NOx emissions from passenger and commercial vehicles. Almost $330 million in DERI grants were awarded to projects in the DFW area, with a projected 63,820 tons of NOx reduced. These projects are projected to reduce NOx emissions by a mere 22.64 tons per day in the DFW area during 2014.[138] This amounts to a whopping $4,795 per ton of NOx removed. To put this in perspective, and as discussed about, SCR technology for individual coal-fired EGUs is capable of achieving the same NOx emissions reductions at *half the cost*.[139] In other words, TCEQ inexplicably suggests that it is unreasonable to require EGUs to pay for and install demonstrated, widely-accepted, and cost-effective SCR technology to control their own NOX emissions, while at the same time suggesting that it is reasonable for Texas taxpayers and consumers to pay nearly double the cost of SCR to provide "incentives . . . to projects to replace, repower, or retrofit eligible vehicles and equipment" that will hopefully achieve NOx emission reductions.[140] And the DERI program happens to be one of the more cost-effective fuel and vehicle emissions programs upon which TCEQ relies to reduce DFW area NOx emissions.

Indeed, TCEQ's proposed SIP relies on numerous economically inefficient incentive and grant programs that cost far more than the installation of SCR. As another example, TCEQ notes that from 2009 through mid-2013, the state issued over $23.6 million grants to replace older, less efficient vehicles with more efficient, cleaner burning ones. These incentives reduced NOx pollution by a mere 314.5 tons—which amounts to *more than $75,000 per ton of NOx removed*.[141] While providing incentives for clean-fuel vehicles is good public policy and provides beneficial emissions reductions, the costs of these programs relative to the emissions reduced are orders of magnitude greater than installing high-quality, reasonably available control technology, such as SCR.

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[138] TCEQ AD SIP at 5-25.

[139] See Environ Modeling at 4 (noting SCR at Martin Lake would result in 24 tons per day reduction in NOx).

[140] TCEQ Ad SIP at 5-25.

[141] *Id*. at 5-26. Several of the programs upon which TCEQ relies to reduce emissions are similarly expensive. The Texas Natural Gas Vehicle Grant Program ("TNGVGP"), for example, was established to provide grants for the replacement of medium-duty and heavy-duty diesel vehicles with vehicles powered by natural gas. From 2011 through August 2013, almost $26 million in TNGVGP grants were awarded for projects to help reduce a projected 816 tons of NOx. This corresponds to approximately $31,862 per ton.

TCEQ's reliance on unproven and expensive incentive measures to reduce NOx pollution is not on inefficient, but inequitable. As the largest single source of NOx emissions contributing to the DFW area's continued nonattainment, coal-fired EGUs and cement kilns should be required to bear the costs of that pollution. Instead, TCEQ has decided to shift that burden to Texas consumers and taxpayers. In the end, Texans who live in and around the DFW nonattainment area bear not only the significant and adverse health costs associated with coal-fired energy generation, but they ultimately shoulder a disproportionate share of the cost of remediating that pollution.

D. Electrification of Compressors is RACT/RACM

(1) Air Pollution from Gas Compressors has a Significant Impact on DFW Ozone Levels

Internal combustion engines provide the power to run compressors that assist in the production of natural gas from wells, pressurize natural gas from wells to the pressure of lateral lines, and power compressors that move natural gas in large pipelines to and from processing plants and through the interstate pipeline network. The engines are often fired with raw or processed natural gas, and the combustion of the natural gas in these engines results in air emissions. Most of the engines driving compressors in the Barnett Shale area are between 100 and 500 hp in size, but some large engines of 1000+ hp are also used. By TCEQ's latest count, there are at least 647 large natural gas compressors stations in the DFW non-attainment area, and unknown thousands of smaller "lift" compressors.

According to TCEQ estimates in the DFW SIP, large compressor stations classified as "point sources" will release 16.37 tons per day of smog-forming Nitrogen Oxide (NOx) pollution, or approximately 5,975 tons per year in 2018, and 26 tons per day of Volatile Organic Compounds (VOCs), or approximately 9,490 tons per year. That's over 60% of all oil and gas industry-generated NOx in the 2018 emissions inventory, and over 50% of all the oil and gas related VOC pollution.

Smaller lift compressors classified as "area sources" could add another six tons of NOx, for a combined compressor total of 22 tons per day/8030 tons a year, and another half-ton per day of VOCs for a combined total of 26.5 tons per day/9672 tons a year.

To put those numbers in perspective, large compressors alone in the DFW non-attainment area are projected by TCEQ to release approximately as much NOx as all area electric generating units in the region in 2018 and almost as much as the maximum amount of NOx allowed to be released by all three Midlothian cement plants. Total VOCs from large compressors are only 7 tons a day less than the total for all non-road vehicles in the entire 10-county non-attainment area. Both large and small compressors are projected by TCEQ to emit over 49 tons of smog-forming pollutants into the air by 2018. That's more than the combined total of smog precursors projected to be released by both the Midlothian cement plants and all DFW non-attainment power plants the same year.

In a 2013 Rand Institute study of the Marcellus Shale gas play, researchers found compressor stations accounted for 60% to 75% of total air pollution from the gas industry, including a third of all VOC emissions and up to 60% of NOx releases. This is in line with TCEQ's 2018 DFW SIP estimates for the percentage of compressor emissions within the total oil and gas industry inventory. Moreover, the report warned that these compressor emissions would persist beyond the initial boom period of shale development and ups and down of annual production rates"

> Most emissions are related to ongoing activities, i.e., gas production and compression, which can be expected to persist beyond initial development and which are largely unrelated to the unconventional nature of the resource. Regulatory agencies and the shale gas industry, in developing regulations and best practices, should consider air emissions from these long-term activities, especially if development occurs in more populated areas of the state where per-ton emissions damages are significantly higher.[142]

This approach is exactly the opposite of the one taken by the TCEQ in projecting future compressor emissions in the 2018 inventory in which those releases are directly tied to what TCEQ estimates will be declining Barnett Shale production rates over the next four years.

Even one compressor can have dramatic impacts on local smog, and multiple, congregated compressors can have even larger impacts:

> Routine emissions from a single gas compressor station or large flare can raise ozone levels by 3 parts per billion as far as five miles downwind, and sometimes by 10 ppb or more as far as 10 miles downwind.
>
> . . .
>
> Given the possible impact of large single facilities, it is all the more conceivable that aggregations of oil and gas sites may act in concert so that they contribute several parts per billion to 8-hr ozone during actual exceedances…Major metropolitan areas in or near shale formations will be hard pressed to demonstrate future attainment of the federal ozone standard, unless significant controls are placed on emissions from increased oil and gas exploration and production....urban drilling and the associated growth in industry emissions may be sufficient to keep the area in nonattainment.[143]

To compound this problem, all 647 large compressor stations and the thousands of smaller lift compressors in the DFW nonattainment area are concentrated in close proximity to

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[142] Aviva Litovitz et al., *Estimation of regional air-quality damages from Marcellus Shale natural gas extraction in Pennsylvania*, 8 *Environ. Res. Lett.*1 at 1(2013).

[143] Eduardo P. Olaguer, The potential near-source ozone impacts of upstream oil and gas industry emissions, Journal of the Air & Waste Management Association (Houston Advanced Research Center July 18, 2012)

the worst-performing air quality monitors, including the one driving the DFW design value (Denton airport in Denton County), and the two other sites that are also on the cusp of violating. or actually do violate the 75 ppb standard by the 2018 deadline (Eagle Mountain Lake and Grapevine Fairway in Tarrant County).

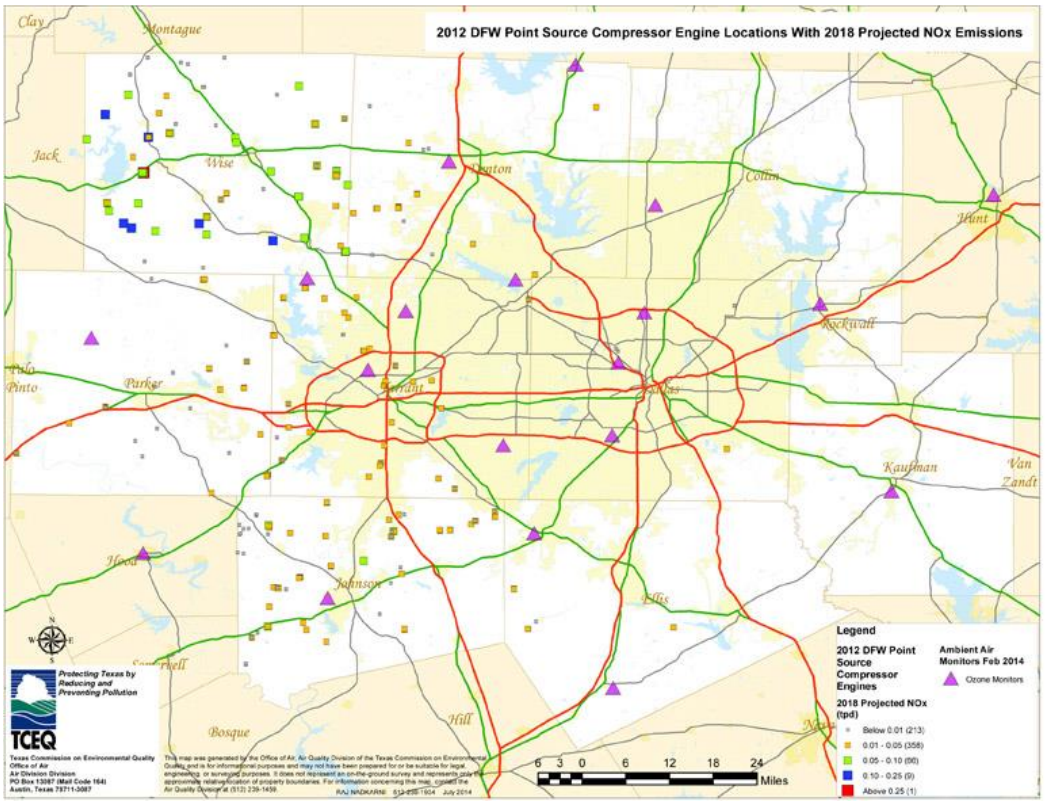

Figure 3: **Location of the 647 large compressor stations in the DFW non-attainment area. Source: TCEQ 2014**

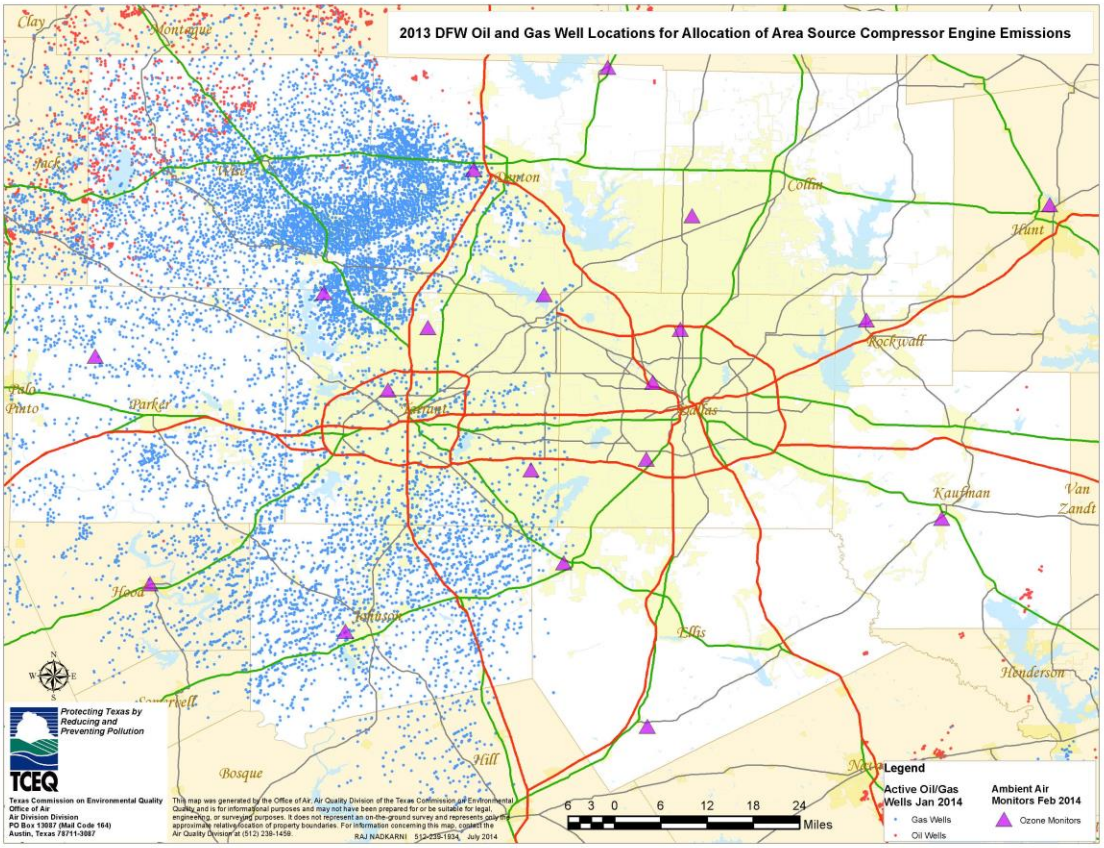

*Figure 4:***Location of the thusands of smaller compressors in the DFW non-attainment area. Source: TCEQ 2014**

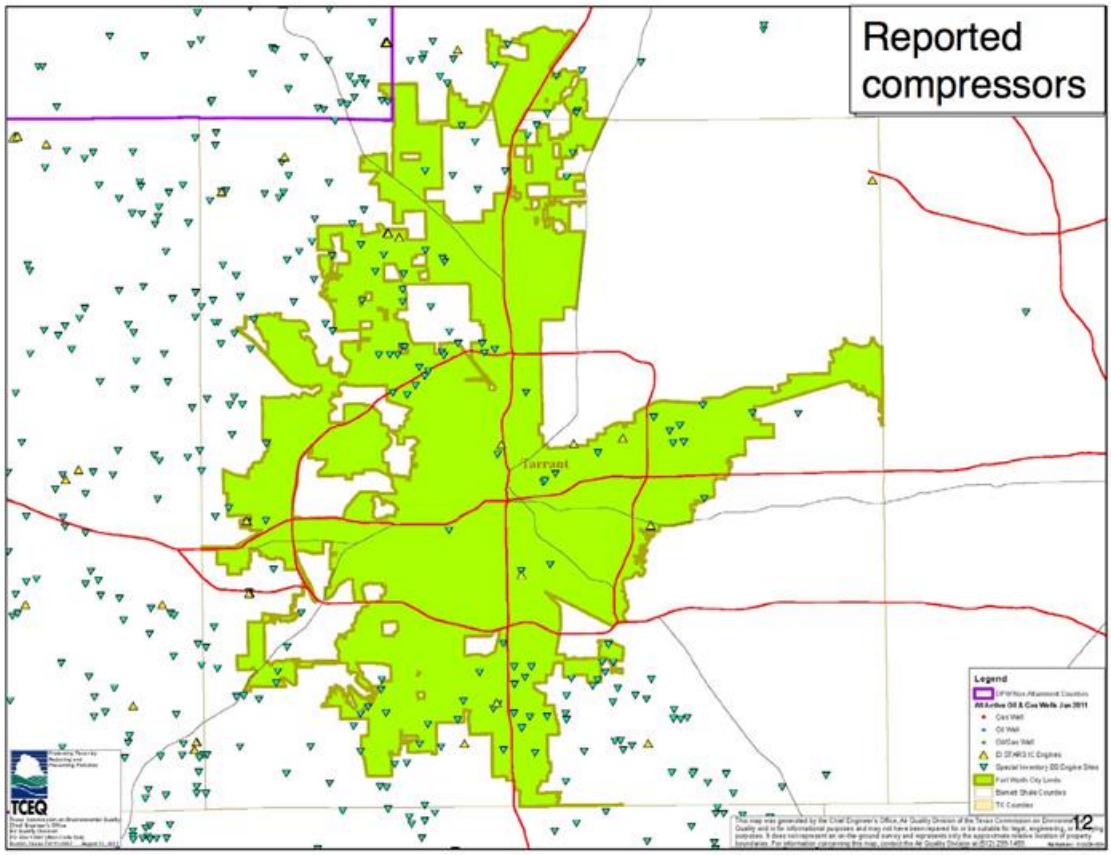

*Figure 5:***Location of large compressors in Fort Worth and Tarrant County. Source: TCEQ 2011**

Unlike the Midlothian cement plant or East Texas coal plants, TCEQ has never performed "sensitivity tests" in its modeling episodes demonstrating how cuts in compressor emissions could influence ozone levels at specific DFW non-attainment area monitors. Yet, TCEQ has recognized the influence is significant.[144] When TCEQ plugged-in lower 2018 emission rates for oil and gas facilities, the Denton air quality monitor had almost an entire 1 ppb reduction in its projected 2018 design value. TCEQ admitted that this reduction was due in whole to the reduction in oil and gas emission inventory. This makes sense because compressors comprise more than 60% of all oil and gas NOx emissions, and more than 50% of the industry's total VOC releases. Since TCEQ is also linking compressor emissions to overall production rates, when lower production rates were plugged into the episode, those rates resulted in lower compressor emissions in the model episode. Indeed, over half of the large decrease in Denton's design value is logically attributable to lower compressor emissions.

A 2014 UNT study contrasting "Fracking" versus "Non Fracking" region monitors substantiates that TCEQ's conclusion. The 2014 University of North Texas study reported 8%

[144] TCEQ, Current Ozone Modeling Results for the 10-County Dallas-Fort Worth (DFW) Area, Air Quality Division Air Modeling and Data Analysis Section, Air Quality Division, DFW State Implementation Plan Technical Information Meeting Arlington, Texas (Aug. 12, 2014).

higher ozone levels in the western half, or "Fracking Region" of the DFW non-attainment area, and an average of two more exceedances a month of the 75 ppb standard than monitors in the rest of the "Non-Fracking" region.[145] Again, since compressors represent more than half of all oil and gas air pollution impacts, it's reasonable to assume that they account for more than half of its influence on air quality monitors in the vicinity. Considering the volume of emissions released by compressors and the HARC study's evaluation of impacts on ozone levels, that may be a conservative estimate.

(2) Compressor electrification is a proven technological feasible technology already being required by local governments in non-attainment areas

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

Electrification of compressors is not a new technology. Developed in the early 1980's, it became more common in the 1990s. Many of the components of an electric motor drive system have undergone technological changes to meet the needs of gas compressor applications. The evolving of variable frequency drives (VFD), variable speed drives (VSD), and motors with advance bearing technologies has provided pipeline compression a more efficient drive system, with larger and more flexible operating envelopes.[146] The technology is widely accepted. In fact, "the use of electric drive for pipeline compressors has come to stay because of its inherent advantage over some other drive option. These advantages include the lower maintenance cost and very importantly lack of on-site emissions."[147]

There is no longer any serious dispute that electrification of compressors is technologically feasible. In fact, the pipeline and natural gas industry have both embraced electric compressors specifically because of its efficacy in reducing NOx emissions and meeting air quality standards.[148] Similarly, the cities of Dallas, Southlake, Flower Mound, DISH, Copper

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[145] Ahmadi and Kuruvilla, An Evaluation of the Spatio-Temporal Characteristics of Meteorologically-Adjusted Ozone Trends in North Texas (Dep't of Mechanical and Energy Engineering, UNT, Apr. 2014).
[146] Rama, J. C., and Gieseche, A., "High-speed Electric Drives: Technology and Opportunity," 3 IEEE Industry Applications Magazine 5 at 48-55 (1997); Interstate Natural Gas Pipeline Efficiency Interstate Natural Gas Association of America (Oct. 2010)
[147] A.Nasir, et al., "Electric Motor Drive for Natural Gas Compression in Pipeline: Techno-economic Analysis," 2 International Journal of Innovative Research in Science, Engineering and Technology 5 at 1 (May 2013).
[148] *See* Compressor Facility - Project Overview and Facility Design, http://engr.smu.edu/~aja/2007-ozone-report/Williams-Gas.pdf ("Selection of this piece of equipment is based on air quality, available power, and the type of compressor selected. Typically electric motors are used when air quality is an issue."); Platts News Service, "NERC chief sees issue with gas pipelines' use of electric compressors," February 8, 2011 ("Pipelines generally use electric compressors to meet air emission requirements under the Clean Air Act in so-called nonattainment areas, said Cathy Landry, spokeswoman for the Interstate Natural Gas

Canyon and other municipalities within the boundaries of both the Barnett shale and the DFW non-attainment are requiring the exclusive use of electric compressors within their city limits. Others, like Fort Worth, have officially encouraged electrification because of air quality problems specifically identified with gas-powered compressors.[149] So many cities are now requiring or encouraging electric compressors that a recent TCEQ presentation to EPA promised to "research the extent that electric compressor motors are being used in populated urban areas instead of natural gas fired compressor engines."[150] Compressor Electrification is certainly technologically feasible, and even preferable.

Indeed, there is considerable information suggesting that electric motors are more reliable and more efficient as stand-alone pieces of equipment than either reciprocating engines or gas turbines. They are able to ramp up quicker than reciprocating engines or gas turbines. They also have an advantage where air quality regulations are an issue because they do not emit NOx and CO at the point of use.[151] According to the Electric Power Research Institute, it is "more efficient to send natural gas to a combined-cycle power plant to generate electricity transmitted back to the pipeline compressor station than to burn the natural gas directly in gas-fired compressor engines."[152] There is better energy conversion efficiency in electric motor than in gas turbine, with over 95% of the electrical energy coming in being converted into mechanical energy going out. This high electric motor efficiency can further be improved with VSD which modulate motor output by varying the speed of the motor itself, rather than through the use of control valves."[153]

Compressor electrification is a technologically feasible control measure. Indeed, the State has previously implemented regulations that established 90% NOx emissions reductions based on the technological feasibility of electrification of internal combustion engine sources at DFW-area airports.[154] The rule, and the associated agreed orders and MOA in 2001, were based on the expectation that most of the existing GSE units (which were at that time powered by

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Association of America. Electric compressors tend to be used in areas that are nonattainment areas, including much of Texas."); Unique Compressor Design Allows Efficient Operation Over Wide Range, http://insights.dresser-rand.com/2013/12/09/unique-compressor-design-allows-efficient-operation-over-wide-range ("As a clean air non-attainment area, an emissions permit at Station 313 would be very difficult for new stationary sources. Permitting was avoided by selecting an electric motor driver instead of a natural gas fired engine or turbine").

[149] City of Fort Worth's Natural Gas Air Quality Study Follow-up on Report Recommendations, August 16, 2011 Encourage the use of air pollution control strategies Electric-driven compressor engines

[150] TCEQ, "Texas Oil and Gas Emissions Inventory Improvement Projects" Air Quality Division, Texas Commission on Environmental Quality (TCEQ) Environmental Protection Agency (EPA)/States Oil and Gas Emissions Summit (Nov. 4, 2014).

[151] Interstate Natural Gas Pipeline Efficiency" Interstate Natural Gas Association of America (October 2010).

[152] Valenti M. "Gas Pipelines Go Electric." Mechanical Engineering, December 1996, *at* http://www.memagazine.org/backissues/december96/features/gaspipe/gaspipe.html.

[153] A.Nasir, et al., Electric Motor Drive for Natural Gas Compression in Pipeline: Techno-economic Analysis," 2 International Journal of Innovative Research in Science, Engineering and Technology 5 (May 2013).

[154] 24 Texas Register 11938, Chapter 114, Rule Log Number 1999-055E-114-AI).

gasoline, diesel, and gas IC engines) could be replaced over a series of years by electric-motor powered units, effectively providing 100% emissions reductions for each vehicle or machine replaced. The GSE electrification program was estimated to reduce NOx emissions by 6 tpd in DFW. TCEQ should follow the regulatory precedent it set with the GSA rule and develop a 90% NOx reduction program for the gas pipeline compressor engines in the DFW non-attainment area. Doing so would provide twice to three times, or more, the reductions in NOx than were obtained with the GSE program and help get DFW into attainment with the ozone standard.

(3) Compressor electrification is an economically feasible control measure

Compressor electrification is not only technically feasible, but electric motors have "approximately the same installed cost" as fired combustion turbines.[155] Moreover, newer high-speed electric motor technology provides means for upgrading, at a fraction of the life cycle maintenance and operational costs of conventional gas powered equipment.[156] Importantly, fuel for gas turbine compressor stations can be used instead for an increase in capacity and operational efficiency, and a decrease in maintenance and cost, thereby yielding significant methane savings and increased revenue for the electrically-driven compressor station.[157]

Additionally, the regulatory costs of compressor electrification are lower. Indeed, any natural-gas-powered combustion engine will produce a number of undesirable combustion products, such as NOx. Catalytic exhaust gas treatments, such as SCR's, can remove a big portion of NOx in the exhaust gas, but also add ammonia to the exhaust gas stream. Products of incomplete combustion include VOC's, CO, methane, and formaldehyde. Fuel bound sulfur will also form SOx in the combustion process. All of these emissions and byproducts are regulated, adding to the cost of operation for conventional gas-fired compressors. Conversely, electric compressors are not subject to these additional costs, and are therefore more attractive economically.[158]

In sum, electric compressors are not a "technology forcing" alternative. They are an off-the shelf, readily-available technology, with strong economic advantages. TCEQ's failure to properly consider and implement compressor electrification as part of its RACT/RACM analysis was error.

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[155] Interstate Natural Gas Association of America, "Interstate Natural Gas Pipeline Efficiency" (October 2010).

[156] Oliver J.A., Samotyj M.J., "Electrification of Natural Gas Pipelines – A Great Opportunity for Two Capital Intensive Industries," IEEE Transactions on Energy Conversion, vol. 14, pp. 1502-1506.

[157] Mokhatab S., *Compressor Station Design Criteria*, Pipeline and Gas Journal (June 2007), http://findarticles.com/p/articles/mi_m3251/is_/ai_n25008106?tag=artBody;col1); Partner Reported Opportunities for Educing Methane, Pro Fact Sheet 103 (2011).

[158] Rainer, Kurz, Gas Compressor Station Economic Optimization, International Journal of Rotating Machinery Volume 2012 (2012), Article ID 715017, 9 pages).

(4) TCEQ Failed to Adequately Evaluate Compressor Electrification as RACT or RACM in the DFW AD SIP

Similar to its incomplete analyses of available high-quality NOx controls at cement plants and coal-fired EGUs, TCEQ fails to even mention compressor electrification in its DFW SIP Appendix on RACT. While the agency admits in its RACM analysis that compressor electrification would reduce NOx, the agency fails to provide any meaningful explanation for rejecting it as a reasonable control measure.

Assuming the same kind of phase-in goal of the Ground Support Equipment electrification policy it implemented beginning in 1999, a 90% reduction in compressor NOx pollution would net almost 15 tons a day. A 90% reduction in all compressor emissions would cut the pollutant by almost 20 tons a day, more than the total released by all area power plants, and more than released by the three Midlothian cement plants. The same strategy would also reduce VOC emissions by 23 tons per day. That represents 43.2 tons per day of ozone precursors reduced, more than all of the smog-forming emissions produced by area power plants and the Midlothian cement plants, combined.

Of course, it's not only the volume of pollution cut, it's also where it is being cut. As noted, all of the existing gas-fired compressors are in close proximity to the worst performing air quality monitors in the DFW nonattainment area. In fact, they are all directly upwind and/or surrounding the monitors that are driving the region's design value and are on the cusp of, or exceed the 75 ppb standard. Compressor electrification cuts air pollution where it counts the most.

Because electric compressors are indisputably "technologically and economically feasible," the state has the burden to provide specific reasons for rejecting those measures for a particular source. TCEQ proffers four reasons, none of which withstand scrutiny.

First, TCEQ states that TCEQ cannot require electrification of compressors because "that would involve requirement of a particular method to control or abate air pollution." This is a fallacious argument. TCEQ may be prohibited from adopting particular technologies to reach clean air goals, but it is certainly free to adopt (and has, in the past, adopted) emission standards that drive the implementation of certain kinds of technology. SCR for coal-fired EGUs is a common example of such a situation: EPA does not mandate SCR, but mandates an emission limit achievable with SCR technology. This is exactly how TCEQ itself has approached rules governing compressors in the Houston nonattainment area. There, TCEQ proposed emission standards for large compressor stations that assumed the partial electrification of that compressor engine fleet at an 80 percent control level. If TCEQ can develop emission limits based on achievable reductions associated with electrified compressors in Houston, it can surely do the same in the DFW area.

Second, TCEQ suggests that 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. This generalized response is insufficient. To reject an economically and technologically feasible control measure, TCEQ must articulate specific

reasons applicable to a particular source. That TCEQ has not even bothered to evaluate how many compressors "may" need line upgrades demonstrates the inadequacy of the agency's analysis. TCEQ has no idea how many compressor station locations are "far from electricity distribution lines." The agency fails to define what "far" is and fails to disclose whether it TCEQ performed a field survey of all 647 compressor stations in the DFW non-attainment area to determine their distances from such lines and their compatibility with electric alternatives

Third, TCEQ asserts that "[i]ncreased electricity demand would require increased generation at existing EGUs with associated increases in NOx 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." TCEQ makes no attempt, however, to quantify that "increased" demand, whether that demand would exceed current or forecast surplus capacity, which fuel would provide the electricity if needed, or how much an increase of NOx would actually occur.

TCEQ further fails to weigh any possible increase in NOx from new power sources against NOx reductions from compressor stations, nor analyze the impacts to DFW air monitors. Nor does TCEQ consider the possibility that any increased demand would be satisfied by non-NOx emitting sources such as wind, solar, hydro and geothermal power, which are estimated to grow from 15,000 to 20,000 megawatts between 2015 and 2018.[159] TCEQ's failure to consider the increased availability of renewable, emission-free energy generation is compounded by the agency's failure to consider or mention decreased estimates of annual growth in future peak demand for electricity in Texas. Forecasts for future peak demand have been cut in half, from 2.5 to 1.3 %, which amounts to approximately 4100 megawatts—twice the capacity of the Comanche Peak nuclear power plant.[160] This explanation does not constitute "specifically grounded" evidence of economic or technologic infeasibility."

Finally, TCEQ throws up its collective hand and states, "[e]ven if all of these equipment hurdles are overcome, since the DFW area currently has low NOx emission specifications, the incremental NOx reduction would be reduced and the price per ton of NOx removed would be prohibitively large." As an initial matter, TCEQ fails to provide an estimate for the cost of electrification, or a definition of "prohibitively large" price per ton of NOx removed. A reduction of 15 to 20 tons of NOx per from the North Texas air shed would be significant. It is especially significant given that it reduces NOx from the proximity of the DFW nonattainment area's worst performing air quality monitors.

TCEQ pins all of its hopes of attainment on the introduction of federal fuel standards that net only a reduction of 9. 98 tons of NOx per day and a 2.39 tons per day in VOCs. Moreover, as discussed above, many of those fuel measures are orders of magnitude more costly than

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[159] Navigant Research, Energy Information Administration, "Clean Economy Rising: Texas winds generate economic growth" Pew Trust, (Nov. 2014).

[160] New report shows peak demand for electricity growing more slowly than in previous years" Electric Reliability Council of Texas, news release, February 28, 2014; "ERCOT now forecasts slower demand in electric growth in Texas, Fort Worth Star-Telegram, (January 23, 2014).

compressor electrification.[161] Moreover, compressor electrification results in as much as 33-50% percent greater NOx reductions, and up to 10 times the VOC reductions, as the fuel measures upon which TCEQ relies. TCEQ can and must adopt all reasonably available control measures that advance attainment. Compressor electrification is one such measure, and TCEQ's failure to properly evaluate and implement those controls renders its analysis arbitrary.

Compressor electrification is a textbook example of what EPA means by RACT/RACM. It's off-the-shelf, readily available technology that's "the lowest emissions limitation that a particular source is capable of meeting." That's why it's in use in so many non-attainment areas already, including others in Texas. That's why it's required or encouraged by so many DFW municipalities now. It offers long-term economic advantages to its operators as well as immediate cleaner air to surrounding populations. It should be required in the DFW non-attainment area.

E. Conclusion

Downwinders at Risk and Sierra Club realize that attainment with ozone standards in the Dallas- Fort Worth area is a technically complicated and politically difficult issue, and we appreciate the opportunity to submit these comments on TCEQ's attainment demonstration state implementation plan for the 2008 eight-hour ozone NAAQS. As explained above, the proposed attainment demonstration is based on an inadequate modeling demonstration that relies upon erroneous, unsupportable, and outdated assumptions, fails to comprehensively and consistently account for emissions from outside the Dallas—Fort Worth area that may raise ozone levels and that can be cost-effectively controlled, and ignores the U.S. Environmental Protection Agency's most recent modeling guidance. As a result, the Proposed AD SIP significantly underestimates likely future design values for ozone and fails to properly evaluate the emissions reductions necessary to demonstrate attainment. We urge TCEQ to embrace its regulatory role and ensure that Texas is taking the necessary steps to bring the area in line with public health standards. TCEQ's approach thus far has not succeeded. In light of the long history of ozone nonattainment in the DFW area and the plain language and purpose of the Clean Air Act, we respectfully urge TCEQ to adopt all reasonably available control measures—including SCR for cement kilns and coal-fired EGUs and electric compressors for oil and gas development—to bring the DFW area into attainment as expeditiously as practicable. We look forward to productively participating in further conversations with the TCEQ and EPA Region 6 on this issue.

[161] TCEQ's own RACM analysis indicates that the Texas Emissions Reduction Plan pays up to $13,000 per ton of NOx removed from mobile sources. At 15 tons a day cut in large compressor station NOx emissions would have to cost more than $71 million before it reached that range.

Sincerely,

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