SIERRA CLUB

July 17, 2023

Via https://tceq.commentinput.com/

Laurie Gharis, Chief Clerk
Erin E. Chancellor, Interim Executive Director
Denine Calvin, MC 206
Texas Commission on Environmental Quality
Office of the Chief Clerk (MC-105)
P.O. Box 13087
Austin, Texas 78711-3087

RE: Sierra Club Comments on Commission Approval for Proposal of the Houston-Galveston-Brazoria ("HGB"), Dallas Fort-Worth ("DFW"), and Bexar County Moderate Area Attainment Demonstration ("AD") State Implementation Plan ("SIP") Revisions for the 2015 Eight-Hour Ozone National Ambient Air Quality Standard ("NAAQS")

Dear Director Chancellor and Chief Clerk Gharis,

Sierra Club submits these comments, on behalf of themselves and their thousands of members who live, work, and recreate in the Dallas-Fort Worth ("DFW"), Houston-Galveston-Brazoria ("HGB") and Bexar County nonattainment areas, where EPA has determined the air is unhealthy to breathe. Sierra Club submits these comments addressing the Texas Commission on Environmental Quality ("TCEQ") attainment demonstrations for the following DFW, HGB, and Bexar County nonattainment state implementation plan ("SIP") rulemakings collectively, because they share many of the same fundamental flaws:

(1) HGB 2015 Ozone NAAQS Moderate AD SIP Revision, Non-Rule Project No. 2022-022-SIP-NR, Docket No. 2023-0306-SIP;

(2) DFW 2015 Ozone NAAQS Moderate AD SIP Revision, Non-Rule Project No. 2022-021-SIP-NR, Docket No. 2023-0305-SIP; and

(3) Bexar County 2015 Ozone NAAQS Moderate AD SIP Revision Non-Rule Project No. 2022-025-SIP-NR. Docket No. 2023-0319-SIP

Specifically, TCEQ's proposed attainment demonstration SIPs are flawed and must be revised for the following reasons:

- First, Texas's SIP revisions for the Dallas-Fort Worth, Houston-Galveston-Brazoria, and Bexar County moderate nonattainment areas unlawfully fails to include reasonably available control technology emission limitations required to attain the NAAQS as expeditiously as practicable.
- Second, as reflected in the attached modeling report of Sonoma Technology,[1] and the technical report of Dr. Ranajit (Ron) Sahu, Ph.D, QEP, CEM (Nevada),[2] Texas must impose reasonable and readily achievable emissions limits equivalent to modern Selective Catalytic Reduction ("SCR") controls on several coal-burning electricity generating units ("EGUs") to address their impacts on public health.
- Third, at a minimum, TCEQ must revisit whether there are reasonably available control measures that could advance attainment in the DFW, HGB, and Bexar County areas.
- Finally, as discussed more fully below, and in the attached August 6, 2021 comments on TCEQ's Request for Reasonably Available Control Measures, [3] TCEQ must revisit the availability of RACT for oil and gas sources that contribute to ozone nonattainment.

In addition, we attach and incorporate by reference comments from several Sierra Club members and supporters who live, work, recreate, own businesses, and breathe the air in the DFW, HGB, and Bexar County nonattainment areas and are directly and adversely affected by ground-level smog. As the attached comments make clear, Texas's persistent and decades-long nonattainment crisis has real-world, everyday impacts on families, businesses, and tourism.

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[1] Ex. 1, Lynn Alley & Kenneth Craig, Sonoma Technology, *Technical Memorandum Re: Analysis of Air Quality Impacts from Coal-Fired EGUs on Ozone Nonattainment Areas in Colorado, Indiana, Kentucky, Missouri, and Texas* (Mar. 2, 2023). [hereinafter, "Sonoma Report"]

[2] Ex. 2, Dr. Ranajit (Ron) Sahu, Analysis of NOx Emissions for Selected Coal-Fired Units. See also Ex. 3, Sierra Club, Analysis of NOx Emission Rates at Selected Coal Fired Electricity Generating Units with SCR.

[3] We attach and incorporate by reference and attach (1) Sierra Club's 2019 comments on TCEQ's Proposed Houston-Galveston-Brazoria Serious Classification Attainment Demonstration SIP Revision for the 2008 Eight-Hour Ozone National Ambient Air Quality Standard ("NAAQS"), Rule Project No. 2019-077-SIP-NR; and (2) Sierra Club's Ideas to the extent those comments address issues similar to those presented here. *See* Ex.3 and 4.

Although we recognize that the measures required to ensure compliance with ozone standards in DFW, HGB, and Bexar County require difficult decisions, TCEQ has failed to fulfill its obligation to protect the public from the deleterious human health and economic impacts of ozone pollution for more than 45 years. Indeed, the Dallas-Fort Worth and Houston areas have continuously failed public health-based National Ambient Air Quality Standards ("NAAQS") for decades. The DFW area has *never* attained a currently-effective NAAQS for ozone, and the area far exceeds the ozone levels current scientific research dictates as necessary to protect human health—especially for sensitive populations such as children, asthmatics, and the elderly.

In the DFW, HGB, and Bexar County SIP revisions, TCEQ's own analysis makes clear that each of the areas will again fail to meet the 2015 ozone NAAQS of 70 parts per billion ("ppb") by the attainment deadline, based on 2023 data.[4] Despite the expected failure to attain for each of the areas at issue, TCEQ's proposed SIP revisions conspicuously fail to identify or include any new emission limitations to attain the NAAQS, and explicitly refuse to conduct any analysis of reasonably available control technology ("RACT") or reasonably available control measures ("RACM") that could advance attainment. In other words, the attainment demonstrations fail, on their face, to demonstrate attainment and therefore, fail to satisfy the Clean Air Act's requirements.[5]

As discussed in more detail below, TCEQ must include RACT and RACM provisions in the revised SIP, as required by the Clean Air Act, and as necessary to attain the NAAQS as expeditiously as practicable.[6] Below and in our previous comments, we explain that Texas's uncontrolled coal-burning power plants and oil and gas sources are responsible for a significant share of the ozone pollution problem in the DFW, HGB, and Bexar County areas. Moreover, there are technologically and economically-feasible RACT and RACM measures, such as nitrogen oxide emission reductions from coal-fired power plants in East Texas,

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[4] HOUSTON-GALVESTON-BRAZORIA MODERATE AREA ATTAINMENT DEMONSTRATION STATE IMPLEMENTATION PLAN REVISION FOR THE 2015 EIGHT-HOUR OZONE NATIONAL AMBIENT AIR QUALITY STANDARD at ES-3, PROJECT NUMBER 2022-022-SIP-NR (May 31, 2023) [hereinafter, "HGB SIP"]; DALLAS-FORT WORTH MODERATE AREA ATTAINMENT DEMONSTRATION STATE IMPLEMENTATION PLAN REVISION FOR THE 2015 EIGHT-HOUR OZONE NATIONAL AMBIENT AIR QUALITY STANDARD at ES-3, PROJECT NUMBER 2022-021-SIP-NR (May 31, 2023) [hereinafter, "DFW SIP"]; BEXAR COUNTY MODERATE AREA ATTAINMENT DEMONSTRATION STATE IMPLEMENTATION PLAN REVISION FOR THE 2015 EIGHT-HOUR OZONE NATIONAL AMBIENT AIR QUALITY STANDARD at ES-3, PROJECT NUMBER 2022-025-SIP-NR (May 31, 2023) [hereinafter, Bexar County SIP"].

[5] 42 U.S.C. §§ 7502(c)(1), (4), (6); 7511a(b).

[6] 42 U.S.C. § 7502(c)(1).

cement kilns in the DFW nonattainment area, and oil and gas emission reduction measures, which will help each of the nonattainment areas come into compliance with the NAAQS, as well as provide Texans and TCEQ with numerous other benefits.

I. INTRODUCTION

Ozone nonattainment in Texas is a public health crisis. Almost half of Texans, over 48%, continue to live in areas that experience extremely high and frequent unsafe ozone levels that exceed EPA's health-based National Ambient Air Quality Standards ("NAAQS"), broadly encompassing Texas' largest urban areas. As discussed in more detail below, high ozone levels in Texas have documented adverse health impacts, including higher levels of asthma and asthma morbidity.[7] Residents living in Texas' urban and environmental justice communities with worse air quality, particularly residents of color, have much poorer health outcomes, reflected in asthma hospitalization rates and other measures.[8] Cities in Texas nonattainment areas have some of the highest environmental justice indices for ozone pollution according to the EPA: only 13% of the U.S. population has worse ozone pollution impacts considering demographic factors of income and race than Dallas.[9] Houston is in the tenth most ozone polluted county in the country.[10] Reducing ozone pollution, including nitrogen oxide ("NOx") emissions, an ozone precursor, is therefore essential to address the adverse and unjust health impacts affecting Texas residents.

Coal-fired EGUs play an outsized role in ozone nonattainment in Texas. These units are exceptionally poorly controlled compared to coal units in the rest of the country–the large majority (over 65%) of Texas' coal fired EGUs lack basic modern pollution controls for NOx, SCR controls, compared to a national average of only 35% without these controls.[11] Moreover, of the few Texas coal fired EGUs that do have SCRs, most (75% of units) are not even using their SCR controls consistent with their SCR's lowest demonstrated NOx emission capabilities.[12] Modeling by Sonoma Technology demonstrates that coal fired EGUs are a major driver of high ozone levels in nonattainment areas and environmental justice communities, including on the days with the highest and most dangerous ozone levels.[13] As a result, Texas' coal fired EGUs stand out for their emissions of NOx, an ozone precursor, and their significant contribution to Texas' unsafe ozone levels.

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[7] *See infra.* Section II.b.
[8] *Id.*
[9] *Id.*
[10] *State of the Air: Most Polluted Places to Live*, Am. Lung Ass'n (2022), https://www.lung.org/research/sota/key-findings/most-polluted-places.
[11] *See* Section II.a.
[12] *See id.*
[13] *See* Section II.b.

Effective November 7, 2022, EPA reclassified the Dallas-Fort Worth ("DFW"), Houston-Galveston-Brazoria ("HGB"), and Bexar County areas from marginal to moderate nonattainment under the 2015 Ozone NAAQS , meaning that air quality is currently unhealthy to breathe for the approximately 14 million Texans who live, work, and recreate in those areas.[14] The moderate nonattainment reclassification requires Texas to revise its SIP and implement reasonably available control technology ("RACT") to reduce ozone emissions and come into attainment as expeditiously as practicable.[15] As discussed in more detail below, Texas must impose emission limits for NOx equivalent to selective catalytic reduction ("SCR") technology on coal fired EGUs to reduce ozone precursor emissions and their public health harms, and directly address the role that coal fired EGUs play in causing ozone exceedances, including on High Energy Demand Days in particular. Alternatively, and at a minimum, TCEQ must immediately impose plantwide emission reductions at the Texas coal EGUs, which would also result in significant reduction in harmful greenhouse gas, sulfur dioxide ("SO2"), nitrogen oxides ("NOx"), mercury, and particulate matter 2.5 ("PM2.5") emissions. The corresponding addition of renewable energy generation to replace that fossil fuel generation (which is already occurring) will result in the creation of thousands of jobs and save millions in Texas retail electricity costs.

II. BACKGROUND

A. Ground-Level Ozone Is Dangerous to Human Health

Exposure to ozone, the main component of smog, has detrimental effects on human health. Ozone exposure, even short-term exposure, is linked to chronic conditions affecting the respiratory, cardiovascular, reproductive, and central nervous systems, as well as mortality.[16] Respiratory symptoms of ozone exposure include coughing, wheezing, and shortness of breath.[17] Notably, ozone exacerbates asthma and can contribute to new onset asthma.[18] Accordingly, ozone exposure is associated with increased asthma attacks, emergency room visits, hospitalization, and medication for asthma.[19]

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[14] 87 Fed. Reg. 60,926 (Oct. 7, 2022), https://www.govinfo.gov/content/pkg/FR-2022-10-07/pdf/2022-20458.pdf; 87 Fed. Reg. 60,897 (Oct. 7, 2022), https://www.govinfo.gov/content/pkg/FR-2022-10-07/pdf/2022-20460.pdf.
[15] *Id.* at 60,900.
[16] *See* EPA, Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards (EPA-HQ-OAR-2008-0699-0404, Aug. 2014).
[17] *Id.* at 3-27.
[18] *Id.* at 3-28.
[19] *See id.*

The health effects of ozone exposure are cumulative, increasing with higher ozone concentrations and increased exposure time.[20] The impacts of ozone exposure on the respiratory system can occur at concentration levels below the 2015 eight hour ozone NAAQS of 70 parts per billion (ppb).[21] In fact, ozone concentrations as low as 60 ppb can cause inflammation and decreased lung function in healthy, exercising adults after 6.6 hours of exposure.[22] Furthermore, studies have observed an association between short-term ozone exposure and hospital admission or emergency department visits at concentrations as low as 31 ppb.[23] Ozone concentrations are highest outdoors, but exposure occurs indoors as well.[24]

While the health impacts of ozone are ubiquitous, certain populations are at an increased risk for ozone-related health effects. Those populations include people with asthma and/or lung disease, children, people over the age of 65, pregnant people, people of color, and outdoor workers.[25] Factors contributing to an individual's risk of ozone-induced health burdens include exposure, susceptibility, access to healthcare, and psychosocial stress.[26] These factors can intersect to place certain individuals at even greater risk. For example, children experience increased exposure to ozone because they are more likely to spend time being active outdoors, and increased susceptibility to the health impacts due to their developing lungs and higher occurrences of respiratory infections than adults.[27]

The pervasive impacts of ozone exposure disproportionately burden communities of color and economically marginalized populations. Higher levels of exposure can be attributed to the historical siting of polluting facilities in marginalized communities as opposed to more affluent, predominantly white neighborhoods.[28] Accordingly, people of color, especially Black individuals, carry a higher asthma burden than white people, and are overrepresented in the nation's ozone nonattainment areas. Furthermore, people of color are more susceptible to the

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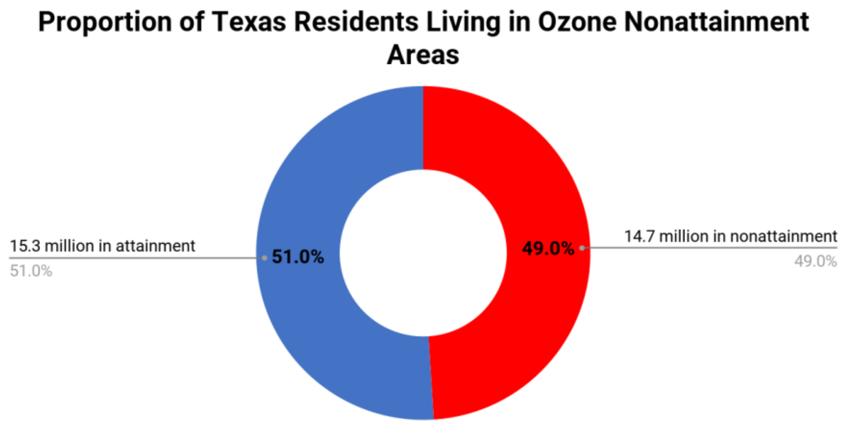
[20] *See id.*
[21] U.S. EPA, National Ambient Air Quality Standards for Ozone, 80 Fed. Reg. 65,292, 65,292 (Oct. 26, 2015).
[22] U.S. EPA, Integrated Science Assessment for Ozone and Related Photochemical Oxidants at IS-1 (2020), available at https://www.epa.gov/isa/integrated-science-assessment-isa-ozone-and-related-photochemical-oxidants/.
[23] *Id.* at IS-27.
[24] U.S. EPA. Integrated Science Assessment for Ozone and Related Photochemical Oxidants at 1-3 (2013), available at https://www.epa.gov/isa/integrated-science-assessment-isa-ozone-and-related-photochemical-oxidants/.
[25] *Id.* at 2-30; U.S. EPA, National Ambient Air Quality Standards for Ozone, 80 Fed. Reg. 65,292, 65,310 (Oct. 26, 2015).
[26] American Lung Ass'n, State of the Air 2022, Tracking Air Pollution & Championing Clean Air 25 (2022), available at https://www.lung.org/getmedia/74b3d3d3-88d1-4335-95d8-c4e47d0282c1/sota-2022/.
[27] *Id.* at 26.
[28] *Id.*

impacts of air pollution, such as asthma, diabetes, and heart condition, because they are more likely than white individuals to be living with one or more chronic conditions.[29]

B. Texans Continue To Experience Extremely High and Frequent Ozone Levels Far In Excess Of Minimum National Ambient Air Quality Standards, Particularly In Urban Areas And In Communities Of Color.

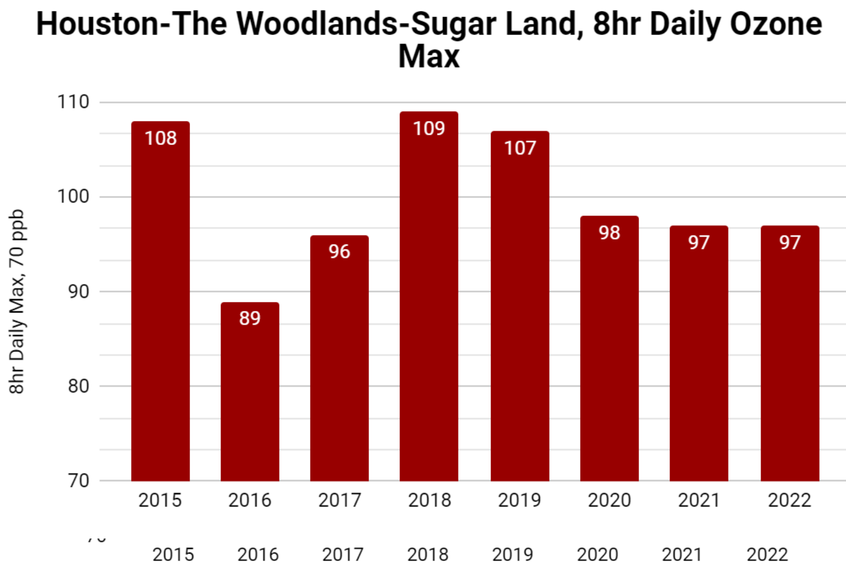
Texas has a clear and persistent problem with high levels of ozone pollution far in excess of minimum national ambient air quality standards. Three areas (DFW, HGB, and Bexar County) are now designated as moderate nonattainment under the 2015 ozone NAAQS, and two areas (DFW and HGB) are also designated as severe nonattainment under the 2008 ozone NAAQS. As reflected below, nearly half of all Texans now live in areas that repeatedly experience air that EPA has determined is unsafe to breathe.[30] These disproportionate pollution burdens result in inequitable, poorer health outcomes among disadvantaged, already overburdened communities of color.

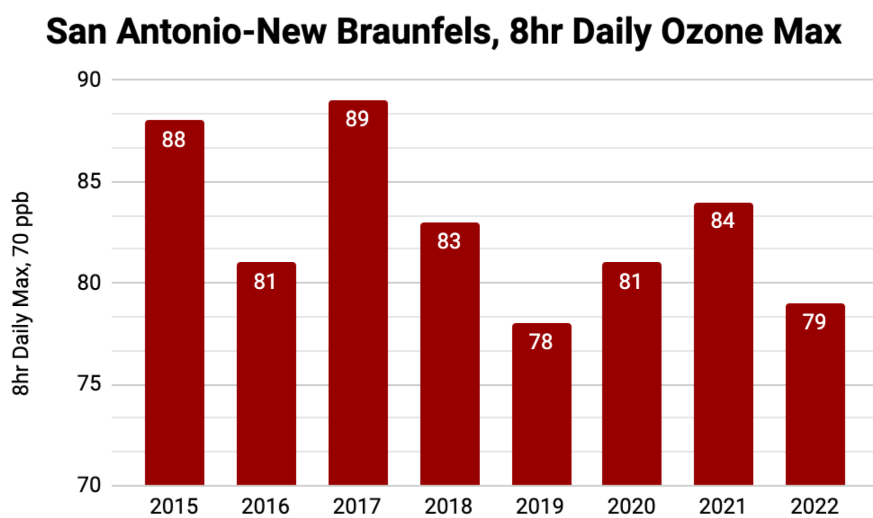


The Dallas-Fort Worth, Houston-Galveston-Brazoria, and Bexar County nonattainment areas have continued to log exceptionally high 8-hr daily ozone

[29] *Id.*
[30] *See* Population in Nonattainment.xlsx; *Summary Nonattainment Area Population Exposure Report*, EPA (last accessed Feb. 10, 2023), https://www3.epa.gov/airquality/greenbook/popexp.html. Data was sourced from this report and compared to the latest Census numbers for Texas.

values through 2022, reaching 114 ppb in the Dallas nonattainment area–61% higher than the NAAQS of 70 ppb.[31]





Cities in these nonattainment areas also experienced dozens of ozone exceedance days annually, with Dallas experiencing 47 exceedance days in 2022 alone, and Houston experiencing 37 exceedance days. The number of exceedance days has increased in Dallas and Houston every year since 2020:[32]

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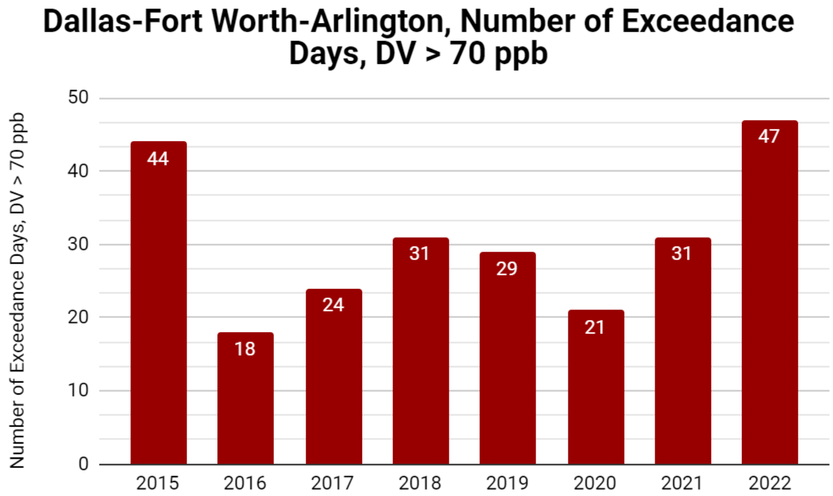
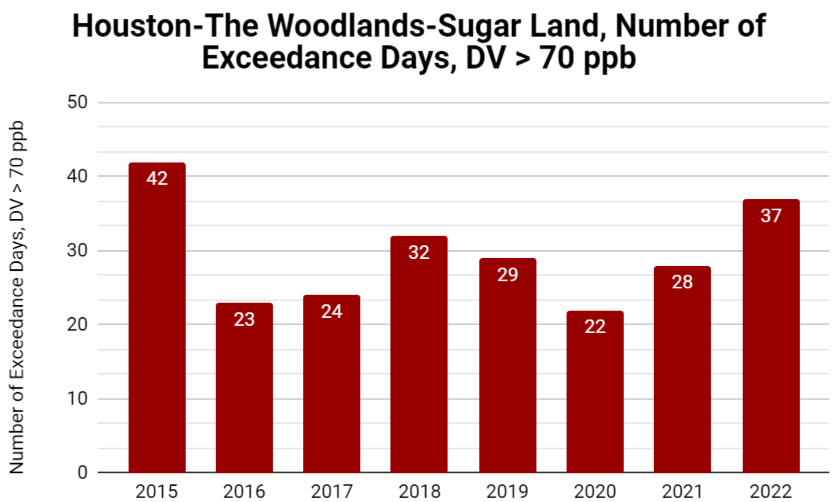
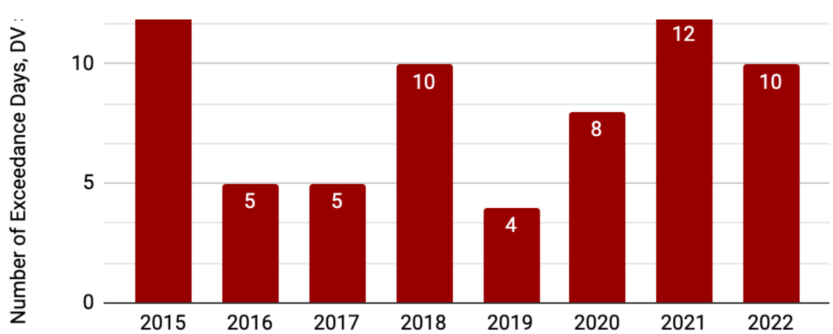
[31] *See* Daily Max & Exceedances.xlsx; *Outdoor Air Quality Data, Monitor Values Report*, EPA (last accessed Feb. 10, 2023), https://www.epa.gov/outdoor-air-quality-data/monitor-values-report. These charts exclude exceptional events.

[32] *See* Daily Max & Exceedances.xlsx; *Outdoor Air Quality Data, Air Data - Ozone Exceedances*, EPA (last accessed Feb. 10, 2023), https://www.epa.gov/outdoor-air-quality-







data/air-data-ozone-exceedances. The number of exceedance days (DV > 0.070 ppm) from 2015 to 2022 for each specified nonattainment area was downloaded and graphed. For the Houston-Galveston-Brazoria nonattainment area, these values are likely an undercount as they were sourced from EPA's Air Quality System based on the Houston-Woodlands-Sugarland Core Based Statistical Area and therefore may not be inclusive of every monitor in the Houston-Galveston-Brazoria nonattainment area.

As these tables show, Texas nonattainment areas are far from meeting the ozone NAAQS, and communities in and surrounding urban areas are routinely exposed to extremely high ozone concentrations. This ozone exposure has a negative impact on human health as explained in the following section.

C. Texas' High Ozone Levels In the San Antonio, Dallas and Houston Nonattainment Areas Demonstrate Clear Adverse Impacts On Environmental Justice Communities.

The adverse health impacts of ozone exposure do not affect all Texas residents equally. EPA's EJScreen tool shows that populations in Texas nonattainment areas have high environmental justice index values for ozone considering both exposure to pollution and socioeconomic indicators.[33] These impacts are reflected in disproportionately poor health outcomes for people of color in Texas' environmental justice communities.

The EJ index for ozone is calculated by combining the environmental factor of ozone concentration with demographic factors, including the low-income and people of color populations residing in a geographic area.[34] In Dallas, the EJ index for ozone is in the 86th percentile compared to the state of Texas and 87th percentile compared to the U.S. This means that only 14% of the state and 13% of the country's population have worse EJ index values for ozone. In Fort Worth, the EJ index for ozone is in the state's 79th percentile and the 80th percentile nationwide. In San Antonio, the EJ index for ozone is in the state's 71st percentile and the 64th percentile nationwide. Thus, ozone nonattainment in Texas is especially harmful considering the impact of ozone pollution on people of color and low-income populations in nonattainment areas.

The unequal burden of ozone-caused public health impacts in Texas is borne out by asthma data. Asthma is one of the primary public health impacts of ozone exposure and affects Black communities at disproportionate rates in Texas, measured by emergency department visit, hospitalization, and death rates:[35]

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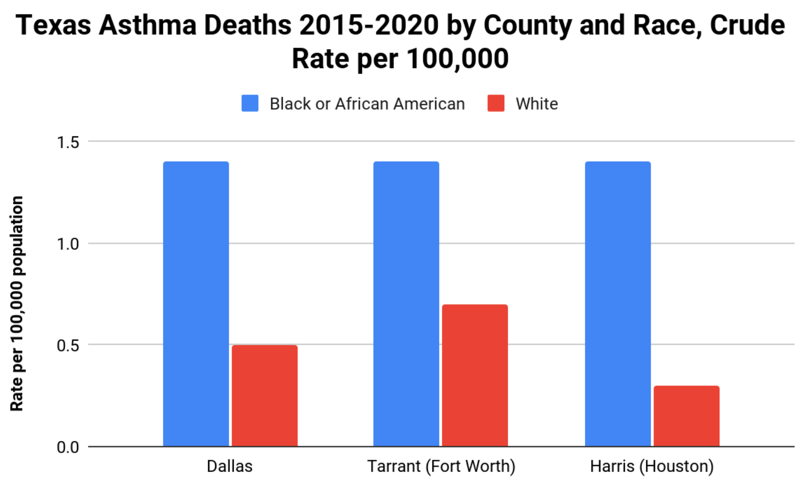
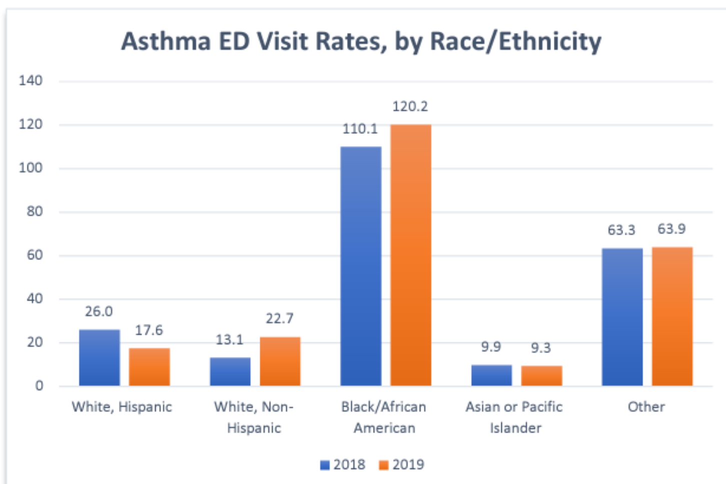
[33] *See EJScreen*, EPA (last accessed Feb. 13, 2023), https://ejscreen.epa.gov/mapper/. Numbers for each city were generated by selecting the city or county, and generating the "Printable Standard Report."

[34] For EPA's explanation of this indicator, see *EJ and Supplemental Indexes in EJScreen*, EPA (last accessed Feb. 13, 2023), https://www.epa.gov/ejscreen/ej-and-supplemental-indexes-ejscreen

[35] Houston Health Dep't, *Houston Asthma Burden Report 2021*, 21, 34 (2021), https://www.houstontx.gov/health/asthma/documents/houston-asthma-burden-report.pdf (emergency department visit and hospitalization rates). Changes in hospital reporting lead to the shift observed in the distribution of asthma hospitalizations by ethnicity. CDC

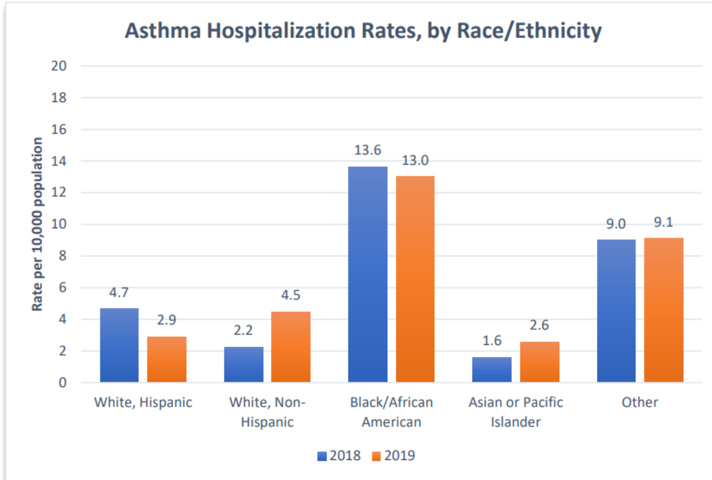


Houston Asthma ED Visit **Crude Rates per 10,000 population,** by Demographics Characteristics.



Wonder, *Underlying Cause of Death Data* (last accessed Feb. 10, 2023), https://wonder.cdc.gov/ (death rates).

Houston Asthma Hospitalization **Crude Rates per 10,000 population,** by Demographics Characteristics.



The Houston Department of Health cites "high ozone days" as one of the "factors that contribute to the burden of asthma in Houston."[36] In particular, the Health Department highlights the fact that the Houston metropolitan area "*consistently ranks as one of the worst air quality regions in the nation for both ozone and annual particle pollution*" and that "for high ozone days and annual particle pollution, the Houston metropolitan area consistently ranked in the top 15 and top 25 worst cities, respectively, from 2017 through 2020."[37]

Reducing ozone pollution and NOx emissions, a precursor to ozone pollution, is therefore essential to reduce the unequal public health harms unjustly borne by low income populations and people of color in Texas. As discussed below, addressing Texas' abysmally poorly controlled coal-fired EGUs is key to addressing the poor health outcomes of Texas' urban environmental justice communities.

D. TCEQ's SIP Revisions Fail to Demonstrate Attainment.

As part of its DFW, HGB, and Bexar County SIP revisions, TCEQ conducted photochemical modeling that, once again, confirms that each of the areas will continue to fail to meet the NAAQS. For DFW, TCEQ admits that, under the best-case scenario, at least six different monitors will have design values above the 2015 ozone NAAQS of 70 ppb.[38] For HGB, again, even under TCEQ's best-case scenarios, ten different monitors are expected to continue violating the standard, with design

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[36] Houston Health Dep't, *Houston Asthma Burden Report 2021*, 8 (2021), https://www.houstontx.gov/health/asthma/documents/houston-asthma-burden-report.pdf.
[37] *Id.* (citing *State of the Air - Texas: Harris*, Am. Lung Ass'n (2020), https://www.lung.org/research/sota/city-rankings/states/texas/harris) (emphasis added).
[38] DFW SIP at ES-3.

values as high as 76 ppb.[39] And for Bexar County, TCEQ's modeling shows that two of the three active monitors will continue to violate the standard.[40]

There are good reasons to believe TCEQ's modeling is optimistic and likely to underpredict ozone impacts. Indeed, according to actual monitoring data for the 2023 season, several ozone monitors in the DFW and HGB areas are already showing significantly elevated ozone levels, with several monitors registering values in excess of 80 ppb, with high values above 100 ppb.[41] If those exceedances continue, each of the areas at issue will far exceed TCEQ's projections.

E. Texas' Poorly Controlled Coal-Fired EGUs Are Major Drivers Of Texas' Extraordinarily High Ozone Levels.

Coal-fired EGUs are a significant source of NOx emissions in Texas and cause of Texas' high ozone levels. These emissions must be reduced to come into attainment with the ozone NAAQS and minimize public health harms. Texas must require its coal fired EGUs to install and operate basic, modern NOx pollution controls–SCRs–to address its nonattainment issues.

1. Overview: Coal Plants in Texas Nonattainment Areas

There are 29 coal fired EGUs in Texas, representing a total capacity of 18,296 MW. In 2021, these plants were responsible for 55,349 tons of NOx emissions, or 6.6% of total NOx emissions in Texas.[42] Despite the prevalence of modern pollution controls on large coal units nationwide, only 35% of the total coal EGU capacity has SCR controls in place to reduce emissions. This is approximately half the the national average: 62% of coal EGUs nationwide utilize SCR:[43]

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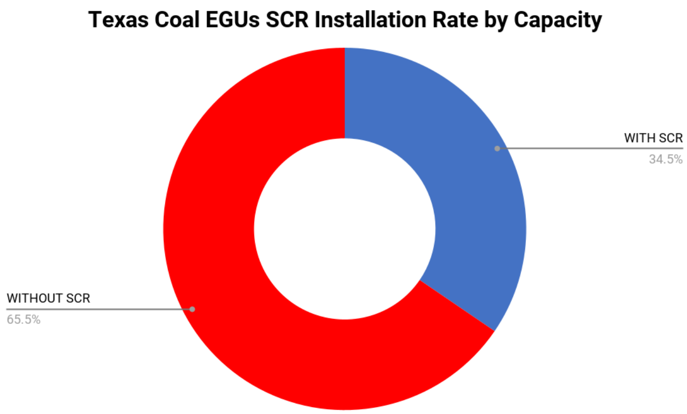
[39] HGB SIP at ES-3.

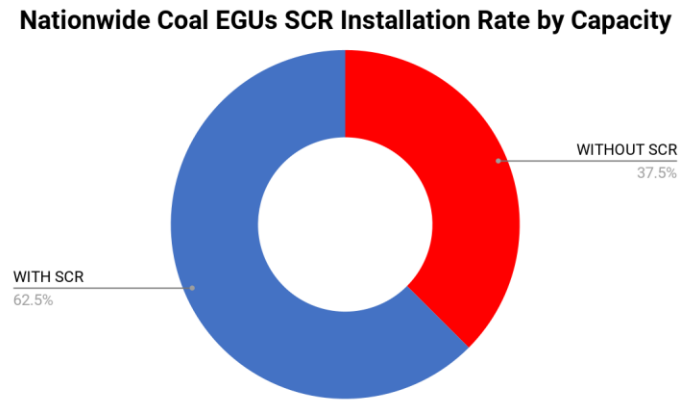
[40] Bexar County SIP at ES-3.

[41] A design value is the statistic used to determine compliance with the NAAQS. For the 2015 eight-hour ozone NAAQS, design values are calculated by averaging fourth-highest daily-maximum eight-hour average (MDA8) ozone values at each regulatory monitor over three years. *See* https://www.tceq.texas.gov/cgi-bin/compliance/monops/8hr_4highest.pl (last visited July 17, 2023) (attached as Ex. 5)

[42] *See* NOx Contribution.xlsx; *Air Pollutant Emissions Trend Data*, EPA (last accessed Feb. 10, 2023), https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data; *CAMPD Power Plant Emissions, Compliance, and Allowance Data*, EPA (last accessed Feb. 10, 2023), https://campd.epa.gov. NEI data was sorted by state and pollutant type to identify annual total NOX emissions within a given state. Coal EGU NOx emissions data for each state was downloaded, then compared to NEI data above to determine in-state NOx emissions attributable to coal EGUs.

[43] *See* SCR Installation & Utilization.xlsx; *CAMPD Power Plant Emissions, Compliance, and Allowance Data*, EPA (last accessed Feb. 10, 2023), https://campd.epa.gov. *S&P Capital IQ Pro*, S&P Global, (last accessed Dec. 3, 2022), https://www.marketplace.spglobal.com/en/datasets/snl-energy-(9).





Sierra Club's analysis of existing SCR installation in the coal fired EGU fleet nationwide demonstrates that SCRs are widespread, in agreement with the EPA's findings in April 2022.[44] Nationally, 56% of coal fired EGUs over 100MW have SCR controls, covering 62% of capacity in megawatts. Thus, nationwide more than half and almost two-thirds of total capacity already have implemented SCR controls.

Moreover, the vast majority of the mere 35% of Texas' coal fired EGUs that have installed SCRs are not even operating the controls at their full capabilities. Indeed, 75% of units do not use installed SCR controls consistent with their SCR's lowest demonstrated NOx emission capabilities:[45]

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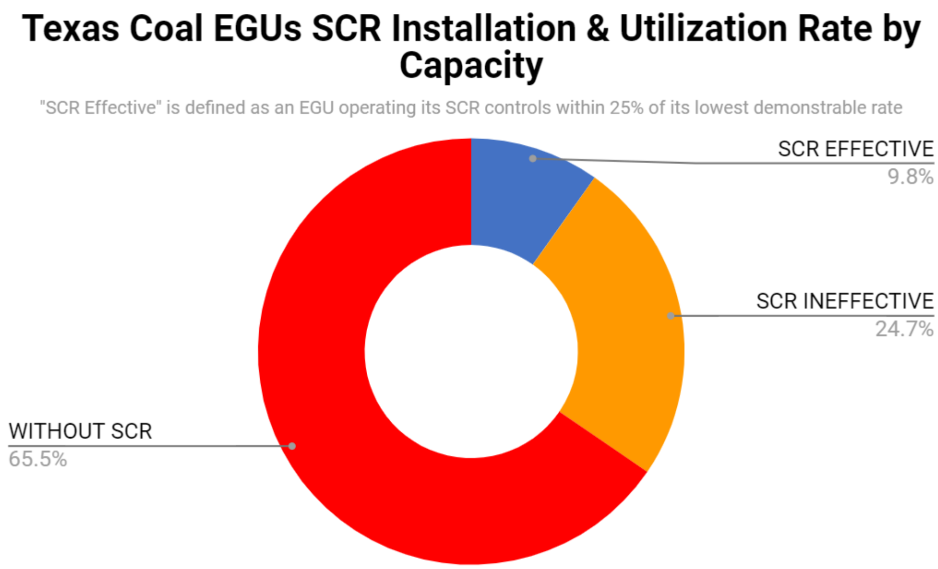
[44] 87 Fed. Reg. 20036, 20,094 (Apr. 6, 2022), https://www.govinfo.gov/content/pkg/FR-2022-04-06/pdf/2022-04551.pdf.

[45] *See infra* n. 90 and accompanying table (SCR Installation and Utilization on Texas' Coal-Fired EGUs).



In short, installation of SCR control technology on Texas coal plants lags far behind nationwide installation of SCRs. Of those plants that do have SCRs, their emission limits are currently too lax to even require consistent SCR operation at their full demonstrated potential.

As demonstrated below, Texas must impose NOx emission limits on its coal-fired EGUs that require installation and operation of SCR controls if Texas is to reach attainment of the 2008 and 2015 ozone NAAQS. These plants are currently major factors driving Texas' nonattainment issues, and only through stringent new emission limits commensurate with installation and consistent operation of SCR can Texas begin to address the environmental justice consequences of its poorly controlled coal fired EGU fleet.

2. <u>Coal Plants Contribute Significantly to Ozone Non-Attainment.</u>

As EPA has recognized, and as explained in Sierra Club's comments on TCEQ's 2015 Nonattainment SIP Revision for the DFW area, Texas coal plants are among the State's largest individual sources of the ozone precursor, nitrogen oxide ("NOx"). Coal plants by themselves account for approximately 22% of the state's annual point source NOx emissions, and approximately 9% of the state's overall NOx emissions.[46] This is unsurprising given the sheer magnitude of each of those facilities, and the lack of modern, and more effective NOx controls.

[46] *See* EPA, Air Markets DataBase, http://ampd.epa.gov/ampd/.

In its review of TCEQ's January 2015 SIP proposal, EPA staff recognized the large role of coal plants in DFW's chronic ozone nonattainment problem.[47] Indeed, EPA observed that TCEQ's "background and transport analyses show that efforts focused solely on controlling local emissions may be insufficient to bring the DFW area into ozone attainment given that, on many days, background estimates are well over half the eight-hour ozone NAAQS of 75 ppb." EPA then concluded that TCEQ's own discussion of the formation, background levels, and transport of ozone "strongly supports the implementation of controls on NOx sources located to the east and southeast of the DFW nonattainment are," and explicitly requested that TCEQ reevaluate the benefits to the DFW area associated with reducing NOx emission "from utility electric generators in just the counties closest to the eastern and southern boundaries of the DFW area."[48]

TCEQ has never responded to that request. Nor has it performed any "sensitivity runs" to estimate the reductions in ozone that would be associated with the installation of emission controls, such as Selective Catalytic Reduction, or the imposition of a mass-based emission limitation at Texas coal plants.

3. <u>CAMx Ozone Source Apportionment Technology Modeling by Sonoma Technology Confirms that Coal Fired EGUs Are Major Drivers of High Ozone Levels in Texas' Ozone Nonattainment Areas and Environmental Justice Communities.</u>

Sierra Club retained Sonoma Technology to model the ozone impacts of Texas' coal fired EGU fleet on nonattainment areas and environmental justice communities using the Comprehensive Air Quality Model with Extensions (CAMx) with Ozone Source Apportionment Technology (OSAT) for the 2016 ozone season (April to October) in Texas.[49] The source apportionment modeling simulations used the EPA's 2016v2 (2016fj_6j) modeling platform, which relies on emissions data from the National Emissions Inventory.[50] Sonoma Technology found that emissions from coal fired EGUS in Texas repeatedly have combined impacts of greater than 1% of the 2008 and 2015 ozone NAAQS at AQS monitoring locations and EJ zip codes within ozone nonattainment areas, often exceeding 1 ppb, and on multiple occasions exceeding 2 ppb. Indeed, on some days, just a single plant's impact, such as W.A. Parish, exceeds 1 ppb. Further, as reflected in the tables below, EGU impacts above 0.5% and 1% of the NAAQS often coincided with days when

[47] Ex. 6 (EPA, Comments Re: Revisions to Dallas-Fort Worth Attainment Demonstration for the 2008 Eight-Hour Ozone Nonattainment Area, Project Number 2013-015-SIP-NR (Feb. 11, 2015)).
[48] *Id.* at 2.
[49] Ex. 1, Sonoma Technology Report.
[50] For an in-depth explanation of the data analysis methods of this report, see *id.* at 1-2, Appendix A.

monitored maximum daily average 8-hour ozone concentrations exceeded the 2008 and 2015 ozone NAAQS.

EPA has considered contributions from *all anthropogenic emissions in an upwind state* to be significant if they exceed 1% of the ozone NAAQS averaged over a subset of high ozone days during an ozone season. Consequently, results showing that *Texas coal units alone* contribute more than 1% of the ozone NAAQS on high ozone days are extremely significant.

4. Texas' Coal Fired EGUs Have Significant Ozone Impacts On The Dallas-Fort Worth And Houston-Galveston-Brazoria Moderate Nonattainment Areas.

On days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb, the ozone impacts from coal fired EGUs in Texas frequently exceed 0.5% and 1% of the ozone NAAQs. For example, as Table 7 of the Sonoma Report shows,[51] on 15 of the 18 days that the Dallas-Fort Worth area exceeded the 2015 ozone NAAQS of 70 ppb, Texas' coal fired EGUs exceeded 0.5% of the NAAQS. On 9 out of 18 days, their contribution exceeded 1% of the NAAQS. Values that equal or exceed 0.5% of the NAAQS are highlighted in yellow and values that equal or exceed 1% of the NAAQS are highlighted in red. In terms of absolute values, on 5 days the EGUs contributed over 1 ppb. Twice, the coal plants contributed over 2 ppb to monitors registering exceedances of the NAAQS.

Texas' coal plants have even more pronounced impacts on the Houston-Galveston-Brazoria nonattainment area. As reflected in Table 8 of the Sonoma Report,[52] included below, Texas' coal plants contributions to high ozone levels exceeded 0.5% of the 70 ppb ozone NAAQS 22 out of 23 days that the Houston-Galveston-Brazoria was in nonattainment in 2016, and exceeded 1% of the NAAQS 18 out of 23 days. Again, values that equal or exceed 0.5% of the NAAQS are highlighted in yellow and values that equal or exceed 1% of the NAAQS are

[51] *Id.* at 17.
[52] *Id.* at 18.

Table 7. Modeled impacts from all selected coal-fired EGUs[1] in Texas (with/without SCR) at AQS monitors and EJ zip codes in the Dallas-Fort Worth ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Eagle Mountain Lake	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/6		0.01											0.01	0.01
6/7	0.04	0.08	0.03	0.04		0.01	0.02		0.01	0.01	0.01		0.03	0.03
6/8					2.02							1.83	1.56	1.59
6/9					0.88							0.65	0.79	0.92
6/10					0.74								0.86	0.76
6/20			1.22		1.20				1.08				0.89	0.90
6/29										0.33			0.33	0.36
6/30					0.63			0.39	0.40			0.61	0.28	0.29
7/1					0.87			0.72	0.62			1.00	0.64	0.71
7/26							1.60			1.41			0.96	1.00
8/5								0.37				0.44	0.28	0.32
8/31		0.38											0.27	0.33
9/11			0.36										0.27	0.38
9/20									2.25				2.00	2.48
9/21					0.67				0.55				0.38	0.32
9/22					0.79							0.74	0.73	0.59
10/1								0.03				0.01	0.07	0.08
10/3		0.88			0.46								0.28	0.23

[1] Selected coal-fired EGUs in Texas include: Coleto Creek, Fayette, JK Spruce, Limestone, Martin Lake, San Miguel, Twin Oaks, Tolk, WA Parish, and Welsh

highlighted in red. In terms of absolute values, on 9 days the EGUs contributed over 1 ppb, and on two days the EGUs exceeded 2 ppb.

Table 8. Modeled impacts from all selected coal-fired EGUs[1] in Texas (with/without SCR) at AQS monitors and EJ zip codes in the Houston-Galveston-Brazoria ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Croquet	Houston Deer Park #2	Houston East	Houston Westhollow	Lake Jackson	Lang	Manvel Croix Park	Northwest Harris County	Zip 77469	Zip 77471	Zip 77479
4/3			0.31										0.48	0.47	0.44
4/5	0.44												0.33	0.26	0.72
4/7		0.54											0.36	0.27	0.84
4/14		0.37											0.79	0.87	0.70
4/15				0.27				0.26					0.78	0.55	0.35
4/23		0.06	0.09	0.29				0.54		0.13		0.35	1.58	1.56	1.20
4/27	0.39		0.61										0.28	0.22	1.50
5/4		0.66											0.37	0.37	0.26
5/6				0.94			0.60	1.04		0.67			2.04	1.77	1.47
5/7	0.25	<0.01	0.22										0.50	0.51	0.67
5/13				0.65				0.68					1.42	1.31	0.86
6/8		0.04			0.21			0.30					2.79	1.51	0.85
7/21			0.28							0.27		0.74	1.17	1.68	0.94
7/22			0.32										1.42	1.20	1.32
8/3			0.23										0.87	0.68	0.67
8/4	0.28												0.82	0.68	0.65
9/21					0.07								0.96	0.50	0.21
9/28						0.41					0.92		1.03	0.65	0.69
9/29									0.64				0.47	0.38	0.31
10/2					0.02						0.01		0.73	0.41	0.15
10/3								0.07					0.67	0.37	0.23
10/10								0.07					1.43	1.09	0.52
10/26			0.09										0.85	0.71	0.43

[1] Selected coal-fired EGUs in Texas include: Coleto Creek, Fayette, JK Spruce, Limestone, Martin Lake, San Miguel, Tolk, Twin Oaks, WA Parish, and Welsh

Indeed, even the impacts of individual coal fired power plants are shown to exceed 1% of the NAAQS. As reflected in Table 11,[53] the WA Parish facility on its own contributed over 0.5% of the 2015 ozone NAAQS on 19 out of 23 days, and over 1% of the ozone NAAQS on 13 out of 23 days that AQS monitors recorded nonattainment days in 2016 in the Houston-Galveston-Brazoria nonattainment area.

[53] *Id.* at 21-22.

Table 11. Modeled impacts from **WA Parish** facility (Units 5, 6, 7, 8 combined, with SCR) at AQS monitors and EJ zip codes in the Houston-Galveston-Brazoria ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Croquet	Houston Deer Park #2	Houston East	Houston Westhollow	Lake Jackson	Lang	Manvel Croix Park	Northwest Harris County	Zip 77469	Zip 77471	77479
4/3			0.03										0.13	0.09	0.14
4/5	0.14												0.18	0.12	0.56
4/7		0.06											0.15	0.05	0.66
4/14		0.01											0.03	0.01	0.02
4/15				0.07				0.07					0.61	0.36	0.20
4/23		<0.01	0.01	0.20				0.46		0.05		0.27	1.49	1.48	1.12
4/27	0.29		0.58										0.27	0.20	1.48
5/4		0.11											0.02	<0.01	0.01
5/6				0.12			<0.01	0.32		0.02			1.33	1.11	0.78
5/7	0.06	<0.01	0.02										0.26	0.25	0.48
5/13				0.26				0.32					1.30	1.15	0.65
6/8		0.01			0.10			0.13					2.70	1.35	0.75
7/21			0.28							0.27		0.71	1.17	1.68	0.94
7/22			0.31										1.42	1.19	1.32
8/3			0.21										0.86	0.68	0.67
8/4	0.21												0.80	0.65	0.62
9/21					0.01								0.91	0.44	0.15
9/28						0.08					0.54		0.58	0.08	0.26
9/29									0.18				0.12	<0.01	0.01
10/2					0.01						<0.01		0.73	0.40	0.14
10/3								0.05					0.65	0.36	0.22
10/10								0.06					1.43	1.09	0.52
10/26			0.01										0.81	0.66	0.38

Sonoma Technology also found that numerous plants in Texas have significant impacts on the 2008 ozone NAAQS of 75 ppb. In the Dallas-Fort Worth nonattainment area, Limestone contributed over 1% and Fayette, Limestone, Martin Lake and Welsh plants each contributed over 0.5% to the 2008 ozone NAAQS on at least one day in 2016.[54] In the Houston-Galveston-Brazoria nonattainment area, Welsh also contributed over 0.5% on one day in 2016.[55]

5. <u>Texas' Coal Fired EGU's Have Significant Ozone Impacts On Environmental Justice Communities In Nonattainment Areas.</u>

Deeply alarming are the outsized impacts that the Sonoma Report shows Texas' coal fired EGUs are having on environmental justice communities in nonattainment areas. To measure the impact of Texas' coal fired EGUs on these communities, environmental justice communities in nonattainment areas were asked to identify the United States Postal Service ZIP Codes that correlated with their communities. Sonoma placed modeling receptors that correlated with these communities' USPS ZIP Codes. Oftentimes these communities are not well reflected

[54] *Id.* at 40-43 (Tables 25, 26, 27, 28).
[55] *Id.* at 44 (Table 29).

in the AQS monitoring network. The location of these EJ community ZIP Codes, of existing AQS monitors, and of coal fired EGUs, are identified in the map included below.[56]

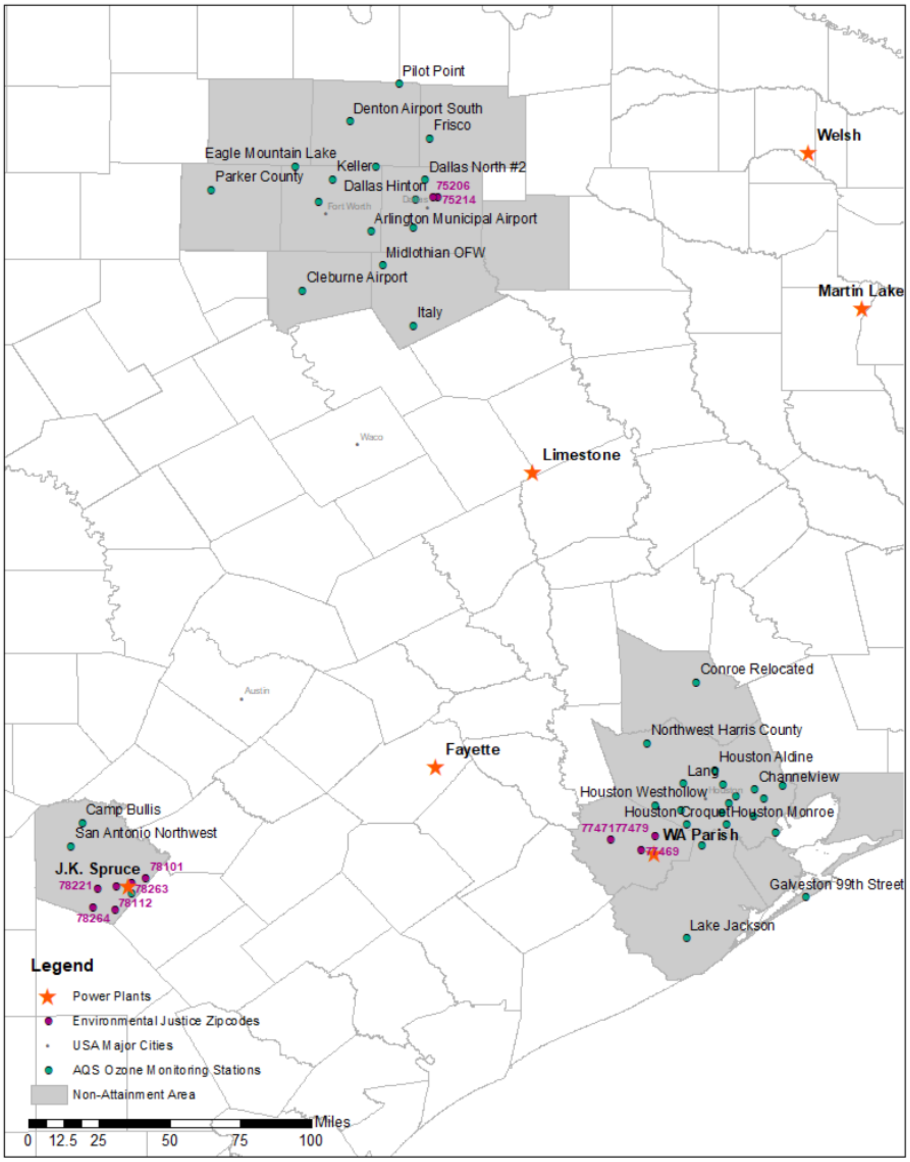


Figure 3. Facility locations with AQS ozone monitoring stations that exceeded that NAAQS and EJ zip codes located in 2015 ozone moderate nonattainment areas.

As the map in Figure 3 of the Sonoma Report makes clear, the monitors are not well located to record ozone levels in those communities. For example, some of the environmental justice ZIP Codes Sonoma modeled were located in the nonattainment area between the WA Parish plant and the nearest AQS monitors,

[56] *Id.* at 20.

which were farther away. As Sonoma Report Table 13 included above demonstrates, the WA Parish plant's impacts exceed 0.5% of the NAAQS in the environmental justice communities that were modeled by Sonoma on almost every day that the ozone monitors in the Houston-Galveston-Brazoria registered an ozone nonattainment day.[57]

III. LEGAL COMMENTS

A. TCEQ's RACT Plans Are Fundamentally Deficient.

Plans for moderate ozone nonattainment areas must include reasonably available control technology ("RACT") for major VOC sources and VOC sources covered by an EPA control techniques guideline ("CTG").[58] Unless the plan can demonstrate that NOx reductions are detrimental, it must also include RACT for major NOx sources.[59] These requirements are independent of and in addition to the requirement for the area to attain the ozone NAAQS.

RACT has been defined by EPA as "as requiring 'the toughest controls considering technological and economic feasibility that can be applied to a specific situation . . . [a]nything less than this is *by definition less than RACT*.'"[60] "RACT is not designed to rubber-stamp existing control methods. It is a technology-forcing mechanism."[61]

As a result, it is arbitrary and capricious to rely on outdated RACT analyses.[62] However, the DFW and HGB plans here do exactly that. They state that they rely on the analyses done in 2020 for 2008 ozone Serious nonattainment

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[57] Sonoma Technology's analysis demonstrates that EPA's 2016 ozone modeling platform underpredicts ozone levels when compared to actual monitored ozone data at AQS monitor cites, as reflected in Appendix B to the Sonoma Report, which compares actual monitored ozone levels at AQS monitors with to modeled values which are denoted in parentheticals. For modeling receptor sites where there were actual AQS monitored data, Sonoma calibrated the modeled values to match the monitored values. For many of the USPS ZIP codes that identify environmental justice communities, there were no AQS monitors to calibrate to, meaning that the modeled ozone contributions at those sites actually understate the ozone contributions of coal fired EGUs to those receptors on nonattainment days.

[58] 42 U.S.C. § 7511a(b)(2); 40 C.F.R. § 51.1312(a)(1).

[59] 42 U.S.C. § 7511a(f); *see also* 40 C.F.R. § 51.1313.

[60] *Sierra Club v. U.S. EPA*, 972 F.3d 290, 294 (3d. Cir. 2020) (quoting Memorandum from Roger Strelow, Assistant Admin. for Air and Waste Mgmt., U.S. E.P.A., to Regional Admins., Regions I - X, at 2-3 (Dec. 9, 1976), https://www3.epa.gov/ttn/naaqs/aqmguide/collection/cp2/19761209_strelow_ract.pdf) (emphasis added).

[61] *Id.*

[62] *Id.* at 302.

area requirements.[63] By itself that does not seem very outdated, but the 2020 analyses themselves rely on outdated analyses. For example, for CTG VOC sources, it appears that the rules merely adopt the recommendations from the CTGs.[64] But, as the plans themselves show, the CTGs mostly date to the 1990s, and in some cases to the 1970s. This was precisely the problem with the RACT analyses in *Sierra Club*.

The Bexar County plan does not even impose RACT. Instead, it "commits" to submit RACT analyses and implementing rules to EPA by May 7, 2024.[65] However, the RACT submittal and implementation of RACT were due January 1, 2023.[66] A bare, unspecific commitment to later submit RACT is not permitted under the CAA.[67] The Bexar County plan is therefore incomplete, a deficiency that will start the clocks for sanctions and a federal implementation plan.[68]

B. Texas Must Impose Reasonably Available Control Technology Emission Limits Equivalent To Installation And Operation of SCR Control Technology to Minimize Coal Plant Ozone Impacts.

Under section 172(c)(1) of the Clean Air Act, 42 U.S.C. 7502(c)(1), TCEQ is required to "provide for the implementation of all reasonably available control measures . . . (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 "as expeditiously as practicable." Moreover, 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."[69] To that end, EPA has consistently interpreted "contribute" to mean those sources that "sufficiently" contribute to nonattainment.[70] Additionally, EPA has consistently found that impacts greater than one percent of the applicable

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[63] *E.g.*, Dallas-Fort Worth Moderate Area Attainment Demonstration State Implementation Plan Revision for the 2015 Eight-Hour Ozone National Ambient Air Quality Standard, App'x D, Reasonably Available Control Technology, at 7.
[64] *Id.* at 11-15, tbl. D-2.
[65] Bexaar County Moderate Area Attainment Demonstration State Implementation Plan Revision for the 2015 Eight-Hour Ozone National Ambient Air Quality Standard, at 4-4.
[66] 87 Fed. Reg. 60,897, 60,900 (Oct. 7, 2022).
[67] *See NRDC v. EPA*, 22 F.3d 1125, 1133=38 (D.C. Cir. 1994).
[68] *See* 42 U.S.C. §§ 7410(c)(1), 7509(a)(1).
[69] 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 (emphasis added).
[70] *Cf. See Catawba Cnty., N.C. v. EPA*, 571 F.3d 20, 39 (D.C. Cir. 2009) (upholding EPA's decision to designate sources as being in nonattainment with the NAAQS where the source is contributing to an areas with a violating monitor).

NAAQS are "significantly" contributing to nonattainment.[71] As discussed in further detail below, several Texas coal EGUs exceed that one percent contribution level and therefore, contribute significantly to nonattainment in the DFW, HGB, and Bexar County areas.

Texas must revise its State Implementation Plans to include reasonably available control technology ("RACT") on major sources that are in state and that have impacts on nonattainment areas significant enough that it is necessary and appropriate to impose RACT controls to address those impacts.[72] Specifically, Texas must:

> provide an analysis of—*and adopt all—RACM, including RACT, needed for purposes of meeting RFP and timely attaining the ozone NAAQS in that area.* EPA interprets the RACM provision to require a demonstration that the state has adopted all technologically and economically feasible measures (including RACT) to meet RFP requirements and to demonstrate attainment as expeditiously as practicable and thus that no additional measures that are reasonably available will advance the attainment date or contribute to RFP for the area . . . .[73]

EPA has defined RACT as "the lowest emission limitation that a particular source is capable of meeting by the application of control technology that is reasonably available considering technological and economic feasibility."[74] In determining RACT, 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

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[71] *See* 76 Fed. Reg. 80760 (Dec. 27, 2011) (final Cross State Air Pollution Rule); 75 Fed. Reg. 45210, 45232-37 (Aug. 2, 2010) (explaining application of one percent significance threshold in proposed Cross-State Air Pollution Rule); 70 Fed. Reg. at 25193 (Clean Air Interstate Rule); 63 Fed. Reg. at 57379-80 (NOx SIP Call).
[72] 87 Fed. Reg. 60,926, 60,931 (Oct. 7, 2022), https://www.govinfo.gov/content/pkg/FR-2022-10-07/pdf/2022-20458.pdf; 87 Fed. Reg. 60,897, 60,900 (Oct. 7, 2022), https://www.govinfo.gov/content/pkg/FR-2022-10-07/pdf/2022-20460.pdf; Clean Air Act § 182(b)(2), (d) (describing RACT requirements for moderate and severe nonattainment area State Implementation Plans).
[73] 87 Fed. Reg. at 21,836 (Apr. 13, 2022), https://www.govinfo.gov/content/pkg/FR-2022-04-13/pdf/2022-07509.pdf (emphasis added).
[74] 57 Fed. Reg. 55,620, 55,624 (Nov. 25, 1992) (citing 44 Fed. Reg. 53,762 (Sept. 17, 1979)), https://www.regulations.gov/document/EPA-R09-OAR-2016-0215-0012.

> that other sources in a source category have in fact applied the control technology in question.[75]

For coal fired EGUs, SCR controls are technologically and economically feasible. As discussed above, SCR controls exist on the majority of coal fired EGUs in the country,[76] and it would constitute a reward to the remaining minority of plants that lack SCR controls to be allowed to bear lower emission costs than their counterparts. EPA itself has recently explained:

> [m]ore than 60% of the existing coal capacity already has [SCR] technology in place. For nearly 25 years, all new coal fired EGUs that commenced construction have had SCR (or equivalent emissions rates).[77]

The Texas SIP revisions for DFW, HGB, and Bexar County must therefore impose NOx limits commensurate with SCR installation and optimal operation as RACT for coal fired EGUs. Not only has EPA's existing actions demonstrated that SCR technology is RACT for large coal fired EGUs and the importance of SCR controls to minimize NOx emissions on high electricity demand days, which frequently correlate with the ozone NAAQS exceedance days that drive ongoing nonattainment. But installing SCRs is technologically and economically feasible for coal plants over 100 MW in Texas. Moreover, any RACT rule that Texas imposes must address units with SCRs already installed that fail to run their controls at full efficacy.

The fact that some of the sources at issue are physically outside the DFW, HGB, or Bexar County nonattainment area boundaries does not preclude TCEQ from applying the RACT regulations to those sources. In similar contexts, TCEQ has used emission limits of sources outside the nonattainment area, including measures to control electric generating units. TCEQ, for example, lists Utility Electric Generation in East and Central Texas, 30 TAC Chapter 117, Subchapter E, Division 1 as one of the existing measures to control ozone in the DFW nonattainment area.[78] TCEQ also lists East Texas Combustion Sources Rule, 30 TAC Chapter 117, Subchapter E, Division 4 as another measure and explains: "Measure implemented to reduce ozone in the DFW nonattainment area although controls not applicable in the DFW nonattainment area[.]"[79] TCEQ certainly has authority to apply RACT to any source in Texas that contributes to ozone nonattainment.

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[75] 57 Fed. Reg. at 18,074 (emphasis added).
[76] *See supra* Section II.a.
[77] 87 Fed. Reg. at 20,094 (citing 63 Fed. Reg. 57,448; 71 Fed. Reg. 25,345).
[78] 2013 SIP 4-2.
[79] *Id.* at 4-3.

1. <u>EPA's Recent Ozone Control Actions Demonstrate that SCR is RACT for Coal-Fired EGUs</u>

The EPA has repeatedly found that SCR control technology is consistent with the definition of RACT. This conclusion is reinforced by multiple recent actions. First, in its Good Neighbor Plan,[80] EPA requires SCR retrofits on coal fired EGUs over 100 MW in upwind states that contribute significantly to downwind nonattainment or maintenance issues. In the proposed and final rule, EPA provides numerous arguments that SCR control technology is widely available and implemented as RACT for local attainment. The final Good Neighbor Plan likewise found that SCR technology was widely employed by large coal units, and in prior guidance has explained that economic feasibility is determined by whether controls are widespread in the industry. Finally, EPA has approved a number of state RACT regulations requiring NOx emissions levels consistent with SCR installation. Together, these actions demonstrate EPA's position that SCR control technology is RACT, and the Texas SIP revisions should therefore require SCR installation and effective use on coal fired EGUs to reach attainment under the 2008 Ozone NAAQS.

a. The Good Neighbor Plan Demonstrates SCR is RACT for Large Fossil Fuel EGUs.

EPA's Good Neighbor Plan demonstrates that SCR control technology is RACT for fossil fuel EGUs. [81] The rule requires emissions reductions for upwind states "commensurate with the retrofit of SCR at coal steam units of 100 MW or greater capacity … [and] oil/gas steam units greater than 100 MW that have historically emitted at least 150 tons of NOx per ozone season" by the 2026 ozone season.[82] EPA assumes a 0.05 lb/mmBtu emissions rate as a reasonable level of performance for units installing new SCRs, and a 0.08 lb/mmBtu rate for units optimizing existing SCRs.[83] EPA's arguments in support of the SCR requirement compel a conclusion that SCR is also RACT for the Texas units. Specifically, EPA reaffirms its position—previously articulated in the Revised Cross-State Air Pollution Rule Update—that SCR controls are "demonstrated technologies" that are "widely practiced" and "widely available" ozone pollution mitigation strategies "across the EGU fleet."[84]

Similarly, the EPA's Cross State Air Pollution rule under the prior 75 ppb ozone standard supports the position that RACT requires implementation of SCR

[80] 88 Fed. Reg. 36,654 (June 5, 2023).
[81] Federal Implementation Plan Addressing Regional Ozone Transport for the 2015 Ozone National Ambient Air Quality Standard, 87 Fed. Reg. 20036, 20,095 (Apr. 6, 2022), https://www.govinfo.gov/content/pkg/FR-2022-04-06/pdf/2022-04551.pdf.
[82] *Id.* at 20,095.
[83] Id. at 20,078, 20,081.
[84] *Id.* at 20,091, 20,094.

controls. There, the EPA stated that "installing new SCRs" and "[f]ully operating existing SCR" are "widely available" emission controls for EGUs.[85]

In the Good Neighbor Plan, not only did EPA find that over 60 percent of existing coal fired EGU capacity has SCR technology, but the requirement for its implementation is longstanding, going back 25 years:

> The 1997 proposed amendments to subpart Da revised the NOX standard based on the use of SCR. The NOX SIP Call (promulgated in 1998) established emissions reduction requirements premised on extensive SCR installation (142 units) and incentivized well over 40 GWs of SCR retrofit in the ensuing years. Similarly, the Clean Air Interstate Rule established emissions reductions requirements in 2006 that assumed another 58 units (15 GW) would be installed in the ensuing years among just 10 states, and an even greater volume of capacity chose SCR retrofit measures in the wake of finalizing that action.[86]

The EPA rulemaking also highlights numerous states' regulatory approaches requiring the adoption of "SCR-based standards as part of stringent NOx control programs" for RACT. In particular, the EPA cited RACT regulations resulting in "remaining coal sources in states along the Northeast Corridor such as Connecticut, Delaware, New Jersey, New York, and Massachusetts all being retrofitted with SCR." [87] The EPA also pointed out SCR installation requirements in Maryland, North Carolina and Colorado.[88] The RACT state regulations are discussed in further detail below.

Because EPA requires SCR-level controls in its ozone transport FIP, it follows that instate RACT controls must be at least as stringent. In the Good Neighbor Plan, EPA states that downwind states must do as much to protect in-state air quality as upwind states do through their good neighbor obligations. Thus, if SCR installation is an appropriate good neighbor control for upwind sources, it follows that this is a reasonably available control technology for similar in-state sources. EPA expressly stated that in determining which upwind emissions are contributing to downwind nonattainment, "EPA assumes that the downwind state

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[85] Revised Cross-State Air Pollution Rule Update for the 2008 Ozone NAAQS, 86 Fed. Reg. 23,054, 23,087 (Apr. 30, 2021), https://www.govinfo.gov/content/pkg/FR-2021-04-30/pdf/2021-05705.pdf.
[86] 87 Fed. Reg. at 20,094 (citing 63 Fed. Reg. 57,448; 71 Fed. Reg. 25,345).
[87] *Id.* (citing EPA–HQ–OAR–2020–0272, Comment letter from Attorneys General of NY, NJ, CT, DE, MA).
[88] *Id.* (citing COMAR 26.11.38 (control of NOX Emissions from Coal-Fired Electric Generating Units); https://www.epa.gov/system/files/documents/2021-09/table-3-30-state-power-sector-regulations-included-in-epa-platform-v6-summer-2021-refe.pdf).

will implement (if it has not already) an emissions control stringency for its sources that is comparable to the upwind control stringency identified [in the rule]."[89] EPA also reiterated its long-standing assumption that downwind states "will make similar reductions as those assumed in [this rule] for purposes of local attainment."[90] Thus, the EPA's position is that emissions levels must be at least as stringent for downwind states as they are for upwind states. Extending this logic, if SCR retrofitting on coal fired EGUs is required for upwind states, SCR implementation is necessarily also required for local attainment according to the EPA.

b. *Numerous States Have Implemented SCR-Level NOx Emissions Limits with EPA Approval.*

EPA has approved numerous state regulations whose NOx emissions limits are consistent with implementation of SCR control technology. For example, Delaware limits NOx emissions to 0.125 lb/mmbtu, demonstrated on a rolling 24-hour average basis.[91] New Jersey's state regulations limit NOx emissions 1.5 lb/MWh demonstrated on a 24-hour average basis between May and September, and on a 30-day average basis between October and April.[92] Connecticut limits NOx emissions from coal fired EGUs to 0.12 lb/mmbtu, based on a daily block average during the ozone season .[93] In New York the one-hour average emissions limit is between 0.08 lb/mmbtu and 0.12 lb/mmbtu for most types of coal units.[94] In Maryland, the 30-day system wide rolling average NOx emissions cannot exceed 0.15 lbs/mmbtu.[95] The state attorneys general for New York, New Jersey,

[89] 87 Fed. Reg. at 20,092 (emphasis added).
[90] *Id.* at 20,099, n.206.
[91] 7 Del. Admin. Code 1146 § 4.3. This regulation applies to coal fired and residual oil-fired electric generating units located in Delaware with a nameplate capacity rating of 25 MW or greater. 7 Del. Admin. Code 1146 § 2.0. For EPA approval, see 73 Fed. Reg. 50,0723 (Aug. 28, 2008); 75 Fed. Reg. 48,566 (Aug. 11, 2010).
[92] N.J. Admin. Code § 7:27-19.4(a), 19.15(a). For EPA approval, see 83 Fed. Reg. 50,506 (Oct. 9, 2018).
[93] Regs. Conn. State Agencies § 22a-174-22e(d)(2)(C). For EPA approval, see 86 Fed. Reg. 37,053 (July 14, 2021); 82 Fed. Reg. 35454 (July 31, 2017)s; 82 Fed. Reg. 59,519 (Dec. 15, 2017).
[94] 6 N.Y.C.R.R. Part 227-2.4. For EPA approval, see 86 Fed. Reg. 54,375 (Oct. 1, 2021); 78 Fed. Reg. 41,846 (July 12, 2013).
[95] Md. COMAR 26.11.38.03B(1). The regulations also required seven units to choose between (1) installing and operating an SCR control system and meeting a NOx emission rate of 0.09lbs/MMBtu on a 30-day average; (2) permanently retiring the unit, (3) permanently switching from coal to natural gas fuel, (4) or meeting either a NO_x emission rate of 0.13 lbs/MMBtu as determined on a 24-hour systemwide block average or a systemwide NO_x tonnage cap of 21 tons per day during the ozone season, by June 1, 2020. *Id.* at 26.11.38.03(C)(2). For EPA approval, see 82 Fed. Reg. 24,546 (May 30, 2017). Maryland's most recent RACT SIP from August 2020 stated that "COMAR 26.11.38

Connecticut, Delaware, and Massachusetts have argued to the EPA and the EPA has itself claimed that these emissions limits represent "stringent Reasonably Available Control Technology on all major NOx … stationary sources."[96] As a result of the stringent NOx emissions approved by the EPA, a number of units in Delaware, Maryland, and New York have assessed investment in SCRs, and in the case of Indian River Unit 4, installed SCR controls.[97] Through its approval of these emissions limits, EPA has determined that NOx emissions levels requiring SCR control technology are RACT.

2. Installing and Effectively Operating SCR Controls is Essential to Curb NOx Emissions on the Days It Matters Most.

SCR installation and effective operation is especially important to address the high NOx emissions associated with high electric demand days. NOx emissions from EGUs are frequently highest on peak energy demand days, and SIP revisions must account for this in implementing RACT. During high temperature, high energy demand days in the summer, units that may operate relatively infrequently

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contains stringent NOx control requirements for certain coal fired EGUs that MDE determined represents NOx RACT level of control." State of Maryland 0.070 ppm 8-Hour Ozone Reasonably Available Control Technology (RACT) State Implementation Plan, SIP Number: 20-11, at 25, (Aug. 10, 2020) https://mde.maryland.gov/programs/air/AirQualityPlanning/Documents/SIPDocuments/OzoneRact/OzoneRACT2015.pdf.

[96] Comments of the Attorneys General of New York, New Jersey, Connecticut, Delaware, and Massachusetts, and the Corporation Counsel of the City of New York 6 (Dec. 14, 2020); 87 Fed. Reg. at 20,094 (citing the comment letter).

[97] *See id.* (describing settlement agreement for C.P. Crane retirement); *see also* MDE Technical Support Document Regarding the Designation of the Area of the Herbert A. Wagner Generating Plant for 1-Hour Sulfur Dioxide at 1, https://www.epa.gov/sites/default/files/2016-04/documents/md-remarks-att1-r2.pdf (Apr. 2016) ("New MDE nitrogen oxide (NOx) regulations (COMAR 26.11.38) that became effective on May 1, 2015, are also pushing changes that will reduce SO2 emissions at the coal fired electricity generating units in the Wagner area. By 2020, both of the coal fired units at the C.P. Crane Generating Station (Crane) are required to convert to natural gas or retire, while Wagner's Unit 2 is expected to convert to natural gas or retire."); DNREC, State Implementation Plan Revision to Address the Clean Air Act Section 110 Infrastructure Elements for the 2008 Ozone National Ambient Air Quality Standard (NAAQS) (July 2012), https://regulations.delaware.gov/register/july2012/general/16%20DE%20Reg%20114%2007-01-12.pdf ("Unit 4 has installed SCR technology and is subject to a NOx limitation of 0.1 llb/mmBTU, 24-hour average, under 7 DE Admin Code 1146, and an associated consent order."); DEC Air Title V Facility Permit to Cayuga Operating Company LLC, Facility DEC ID 7503200019, at 85-86 (permit effective Jan. 29, 2015) https://www.dec.ny.gov/dardata/boss/afs/permits/750320001900016_r2.pdf. The permit states that these options are required pursuant to 6 N.Y.C.R.R. Part 227-2.5, the regulation describing compliance options for NOx RACT. *Id.*

regularly come online to meet demand with disproportionately high NOx emissions. Assessing the 12 states affected by the CSAPR Update rule, EPA found that emissions rates from these peaker units "can be up to 118 times their respective state averages."[98] Maryland, for its part, found that "up to an excess of 47 tons" of NOx emissions are released daily by coal fired plants in Pennsylvania on many summer days.[99] Yet if coal fired EGUs "ran existing control technology [including SCR] consistent with manufacturers' specifications," excess NOx emissions on summer days would not be emitted.[100]

To fix the problem of ozone exceedances on high energy demand days, multiple states have adopted regulations to address increased NOx emissions on high electricity demand days. For example, Maryland imposes a 0.13 lb/MMBtu NOx emissions limit determined on a 24-hour systemwide block average for certain coal fired EGUs and mandates that installed controls must be run at all times.[101] In 2020, New York adopted a rule limiting emissions from peaker plants to 25 ppmvd (gas-fired) or 42 ppmvd (oil-fired).[102] As an alternative to meeting these emissions limits, plants may opt to (1) agree not to run during the ozone season, or (2) meet an output-based daily average NOx emissions rate of 1.5 lb/MWh (gas) or 2.0 lb/MWh (oil) that includes electric storage and renewable energy.[103] The New Jersey regulations limit NOx emissions for "HEDD unit[s]" to between 0.75 lb/MWh and 1.6 lb/MWh, depending on whether the unit is oil or gas-fired and a simple or combined cycle combustion turbine.[104] Given the impact of ozone exceedances on high energy demand days, statewide SIP revisions requiring installation and effective operation of SCR controls at all times are essential to reach ozone attainment.

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[98] *EGU NOx Mitigation Strategies Proposed Rule TSD*, EPA Docket ID No. EPA-HQ-OAR-2020-0272, at 16 (Oct. 2020); *EGU NOx Mitigation Strategies Proposed Rule TSD*, EPA Docket ID No. EPA-HQ-OAR-2021-0668, at 35 (Feb. 2022).
[99] MDE, Petition to the Ozone Transport Commission for Additional Control Measures Pursuant to Section 184(c) of the Clean Air Act 2 (May 30, 2019).
[100] MDE, *Petition to the Ozone Transport Commission for Additional Control Measures Pursuant to Section 184(c) of the Clean Air Act, Attachment 6 Additional Technical Support Document* 1 (May 30, 2019).
[101] Md. COMAR 26.11.38.04, 26.11.38.03B(1); *see also* MDE, *Technical Support Document for COMAR 26.11.38 - Control of NOx Emissions from Coal-Fired Electric Generating Units* 20 (May 26, 2015), https://mde.maryland.gov/programs/Regulations/air/Documents/TSD_Phase1_with_Appendix.pdf (explaining that the NOx emissions regulations are intended to address the "'peak days' or episodic air quality events when high temperatures trigger high electricity demand and elevated ozone pollution levels"); 41:19 Md. R. 1243-46 (Sept. 18, 2015).
[102] 6 N.Y.C.R.R. Part 227-3.
[103] *Id.*
[104] N.J.A.C. 7.27-19.5.

3. Implementing SCRs as RACT is Economically and Technologically Feasible in Texas.

Installing SCRs on Texas coal plants is both economically and technologically feasible and is therefore required RACT for the state's SIP revisions. Technological feasibility is undisputed and readily established by the widespread implementation of SCRs recognized by the EPA, as described above.[105] SCRs are economically feasible for coal fired EGUs in Texas using both a source category analysis and considering cost per ton. Again, the economic feasibility of RACT "rests very little on the ability of a particular source to 'afford' to reduce emissions to the level of similar sources" and instead turns on whether other sources in that category have applied the control technology.[106] From this perspective, SCRs are economically feasible considering the number of coal fired EGUs that have applied SCRs nationwide and EPA's own findings that SCRs are widely available.

EPA has also considered cost per ton of NOx emissions reductions and determined that installation of new SCRs at a cost of $11,000 per ton of emissions reductions is cost effective and economically feasible.[107] In particular, in the proposed cross-state air pollution rule, EPA provided that coal fired EGUs over 100 MW must install SCR controls and estimated that installation of new SCRs costs $11,000 per ton.[108] Moreover, other states have adopted regulations requiring SCR-level NOx emissions limits while estimating much higher cost per ton of NOx emissions. Connecticut's NOx emissions control program is based on a control stringency of $13,635 per ton of NOx emissions reductions.[109] New Jersey found that controls for oil-fired boilers up to $18,000 per ton, and up to $18,983 per ton for SCRs for gas turbines are cost effective and reasonably available.[110] Thus, EPA's $11,000 cost per ton benchmark for cost effectiveness is well within the parameters that states have set for economic feasibility of control technologies.

Sierra Club retained Ron Sahu, an engineer with expertise in controls on coal fired EGUs, to conduct an analysis of the cost effectiveness of SCR installation on coal fired EGUs in Texas. His conclusion is that it is economically feasible even using the EPA's lower benchmark of $11,000 cost per ton of NOx emissions reductions. For all coal fired EGUs with over 100 MW of capacity lacking SCR

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[105] *See supra*, Sections II.a, III.a.
[106] 57 Fed. Reg. at 18,074 (emphasis added).
[107] 87 Fed. Reg. 20,036, 20,081 (Apr. 6, 2022), https://www.govinfo.gov/content/pkg/FR-2022-04-06/pdf/2022-04551.pdf.
[108] *Id.*
[109] Regs. Conn. State Agencies § 22a-174-22e(h)(1)(A)(iii).
[110] NJ DEP, State Implementation Plan Revision for Infrastructure and Transport Requirements for the 70 ppb and 75 ppb 8-hour Ozone NAAQS and Negative Declaration for the Oil and Natural Gas Control Technique Guidelines 15 (May 2019), https://dep.nj.gov/wp-content/uploads/airplanning/InfraTransportSIP2019-FinalSIP.pdf.

except Tolk 1 and 2, Ron Sahu found that installation of SCR control technology costs less than $11,000 per ton:[111]

SCR Cost Effectiveness Analysis for Texas Coal-Fired EGUs Over 100 MW Without SCRs

Plant	Unit	Unit Size (MW)	Median NOx [112]	SCREff	Post SCR NOx	Capacity Factor[113]	SCR Cost Effectiveness[114]	SCR CE w/Multi-unit Discount [115]
JK Spruce	1	556	0.146	70	0.044	69.5	$9,255	
Limestone	1	893	0.152	70	0.045	55.1	$10,501	$8,926
Limestone	2	957	0.168	70	0.500	63	$8,411	$7,149
Martin Lake	1	793	0.151	70	0.045	62.6	$9,538	$8,108
Martin Lake	2	793	0.152	70	0.046	60.1	$9,838	$8,362
Martin Lake	3	793	0.144	70	0.043	66	$9,618	$8,175
Sam Seymour	1	615	0.125	70	0.037	74.5	$10,158	$8,634
Sam Seymour	2	615	0.114	70	0.034	76.6	$10,573	$8,987
Sam Seymour	3	460	0.126	70	0.038	86.8	$8,927	$7,588

[111] Ex. 2, Dr. Ranjit Sahu, *Analysis of NOx Emissions for Selected Coal-Fired Units*.
[112] 2018-September 2022 Monthly NOx (lb/MMBtu).
[113] Maximum of: Median Monthly 2017-2021 or Jan-Oct 2022.
[114] SCR Cost Effectiveness, $/ton.
[115] Multi-unit discount assumed to be 15% lower than calculated cost.

Tolk	1	568	0.161	80	0.032	35.6	$14,029	$11,925
Tolk	2	568	0.156	80	0.031	36.8	$13,903	$11,818
San Miguel	1	410	0.156	70	0.047	76.8	$8,273	

SCR control technology costs less than $11,000 per ton of NOx emissions for Texas coal fired EGUs over 100 MW, and is widespread throughout the source category. Therefore, SCR controls are technologically and economically feasible and must be implemented in the Texas SIP revisions for moderate and severe nonattainment areas under the 2015 and 2008 ozone NAAQS.

Moreover, Texas' coal fired EGUs have time to install the SCRs. For the 2008 Severe Nonattainment SIP, EGUs have a RACT installation deadline of November 7, 2025.[116] Texas has missed both its final RACT rule submission deadline and its RACT implementation deadline of January 1, 2023 for the 2015 Moderate SIP, meaning that RACT implementation by the 2015 RACT deadline is now an impossibility.[117] Thus, applying EPA's impossibility doctrine, upheld by the DC Circuit in *Wisconsin v EPA,* and following EPA's reasoning in its Proposed Transport Rule, Texas should require installation of SCRs by "the earliest [] attainment date by which the required emissions reductions from these strategies are possible."[118] [119]

As Dr. Sahu identifies in his report, there are multiple regulatory and industry authorities indicating that SCRs can be installed in as little as 48 weeks, or as much as 21 months at individual units, and on a fleet wide basis, 36 months. There is therefore plenty of time for Texas's EGUs to install SCRs to meet RACT implementation deadlines.

> EPA has previously concluded that an SCR can be installed at a coal fired EGU in as little as 21 months, while multiple SCRs at the same

[116] 87 Fed. Reg. 60,926, 60,931 (Oct. 7, 2022), https://www.govinfo.gov/content/pkg/FR-2022-10-07/pdf/2022-20458.pdf.
[117] 87 Fed. Reg 87 at 60900
[118] 87 Fed. Reg. 20,102 (Apr. 6, 2022) (citing Wisconsin v. EPA, 938 F.3d 303 (D.C. Cir. 2019)) (emphasis added), https://www.govinfo.gov/content/pkg/FR-2022-04-06/pdf/2022-04551.pdf.
[119] 87 Fed. Reg. 20,099 ("Additional emissions reductions that the EPA finds not possible to implement by [the]
attainment date are proposed to take effect as expeditiously as practicable, with the full suite of emissions reductions taking effect by the 2026 ozone season, which is aligned with the August 3, 2027, attainment date for
areas classified as Serious nonattainment under the 2015 ozone NAAQS.").

facility may take longer. Environmental Protection Agency, Final Report, Engineering and Economic Factors Affecting the Installation of Control Technologies for Multipollutant Strategies 5 (2002), EPA-600/R-02/073, available at https://archive.epa.gov/clearskies/web/pdf/multi102902.pdf ("It is expected that one SCR system requires about 21 months of total effort for planning, engineering, installation, and startup. Multiple SCR systems at one facility would take longer to install (e.g., approximately 35 months for seven SCRs."). Industry estimates are even shorter. Institute Of Clean Air Companies, Typical Installation Timelines for NOx Emissions Control Technologies On Industrial Sources (December 2006), available at https://cdn.ymaws.com/www.icac.com/resource/resmgr/ICAC_NOx_Control_Installatio.pdf (48-58 weeks from commercial RFQ date). Other state air agencies have similarly relied upon a 21-month installation timeline. See Maryland Department of the Environment TECHNICAL SUPPORT DOCUMENT FOR COMAR 26.11.38 - Control of NOx Emissions from Coal-Fired Electric Generating Units available at https://mde.maryland.gov/programs/Regulations/air/Documents/TSD_Phase1_with_Appendix.pdf.[120]

As Dr Sahu explains, "there are no significant long-lead items that drive longer SCR installation schedules:" a very conservative estimate is that SCRs can be installed in as little as 26 months at individual units.[121]

4. <u>Texas Must Require More Effective Operation of SCRs for EGUs with SCR Technology.</u>

For coal fired EGUs with SCR control technology already installed, Texas must impose NOx limits in its SIP that are commensurate with optimal usage of SCRs consistent with manufacturer specifications and good engineering practices. Doing so will ensure that NOx emissions in practice are consistent with the lowest demonstrated NOx reduction efficacies of existing SCRs at each unit. The Sahu analysis attached as Exhibit X and excerpted below found that W.A. Parish's units with SCR controls rarely operate with NOx emissions below 0.07 lb/MMBtu, even though EPA's Clean Air Markets Database (CAMD) demonstrates that those units can and have met lower emissions rates with the SCRs they already have installed.

W.A. Parish provides an excellent example of why tightening existing NOx limits on Texas' coal fired EGUs with existing SCRs is so crucial to protecting vulnerable populations, including environmental justice communities. As discussed above, W.A. Parish is located in the Houston-Galveston-Brazoria nonattainment

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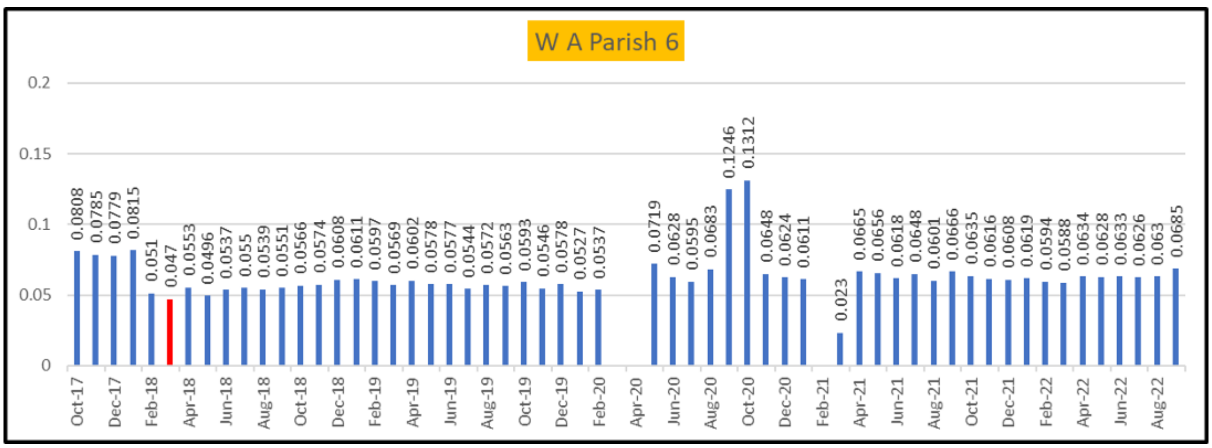
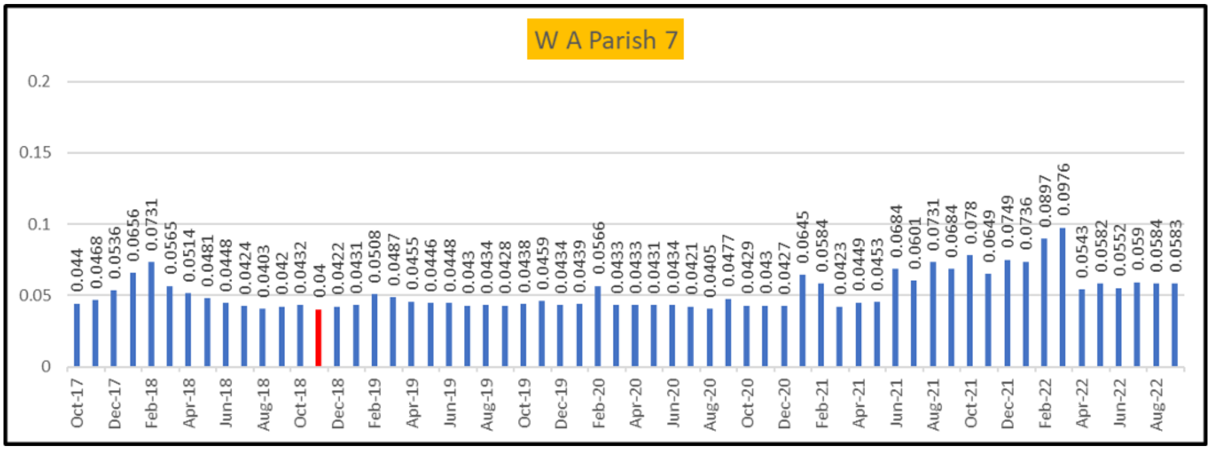
[120] Sahu Report, Ex. 2 at 4-5.
[121] *Id.* at 4, 5

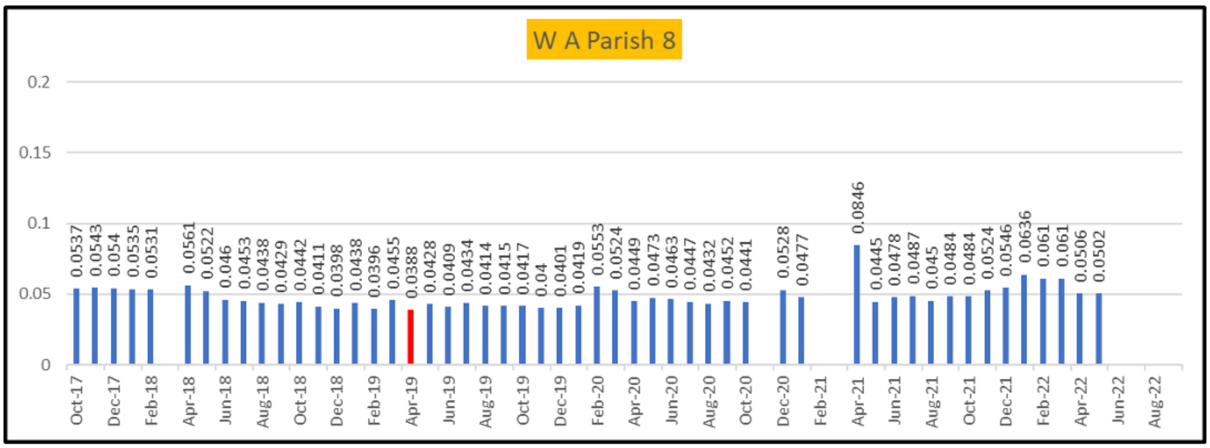
area and contributes over 1% of both the 2008 and 2015 ozone NAAQS levels to AQS monitors and EJ community ZIP Codes on ozone nonattainment days.[122] Yet the following tables, which provide monthly NOx emissions in lb/MMBtu pulled from EPA's CAMD database, demonstrate that the units rarely operate consistent with their lowest month's emissions, which are highlighted in red, even during ozone season:[123]



[122] Lynn Alley & Kenneth Craig, Sonoma Technology, *Technical Memorandum re: Analysis of Air Quality Impacts from Coal-Fired EGUs on Ozone Nonattainment Areas in Colorado, Indiana, Kentucky, Missouri, and Texas*, Tables 11, 24 (March 2, 2023); *see also supra* Section II.b.

[123] Ex. 2, Dr. Ranjit Sahu, *Analysis of NOx Emissions for Selected Coal-Fired Units* at 21-24.


W A Parish 7


W A Parish 8

SCR Installation and Utilization on Texas' Coal-Fired EGUs[124]

Facility	Unit	Year Online	Nameplate Capacity (MW)	N0x Controls	SCR?	2022 Total NOx Tons	2022 Ozone Season Avg NOx Rate (lbs/MMBtu)	2022 Avg Annual NOx Rate (lbs/MMBtu)	Period of Lowest 30 Day Avg NOx Rate (Units with SCR)	Lowest 30 Day Avg NOx Rate (lbs/MMBtu) (Units with SCR)	2022 Avg Annual Rate is __% of Lowest 30 Day Rate (Units with SCR)	Operating Within 25% of Lowest Dem. Rate? (Units with SCR)
Coleto Creek	1	1980	662	LNB, OFA	No SCR	2273.81	0.1646	0.1587	NA	NA	NA	NA
Fayette Power Project	2	1980	615	LNB, OFA	No SCR	2465.111	0.1091	0.1127	NA	NA	NA	NA
Fayette Power Project	3	1988	460	LNB, OFA	No SCR	2181.434	0.118	0.1229	NA	NA	NA	NA
Fayette Power Project	1	1979	615	LNB, OFA	No SCR	1692.494	0.1178	0.1265	NA	NA	NA	NA
Harrington	1	1976	360	LNB, OFA	No SCR	1150.391	0.1633	0.1573	NA	NA	NA	NA
Harrington	2	1978	360	LNB, OFA	No SCR	1172.66	0.1568	0.1515	NA	NA	NA	NA
Harrington	3	1980	360	LNB, OFA	No SCR	1847.685	0.1915	0.1893	NA	NA	NA	NA
J K Spruce	1	1992	566	LNB, OFA	No SCR	2445.959	0.138	0.1453	NA	NA	NA	NA
J K Spruce	2	201	878	LNB,	SCR	944.79	0.0472	0.0457	Dec-20	0.0313	146%	NO

[124] *See S&P Capital IQ Pro*, S&P Global, (last accessed Dec. 3, 2022), https://www.marketplace.spglobal.com/en/datasets/snl-energy-(9); *CAMPD Power Plant Emissions, Compliance, and Allowance Data*, EPA (last accessed Feb. 10, 2023), https://campd.epa.gov. The lowest 30 day average NOx rate was calculated by dividing the sum mass of a unit's monthly NOx emissions by its sum monthly heat input from October 2017 to October 2022. The lowest was then identified and compared to its 2022 average annual NOx rate to determine the consistency and efficacy of its SCR controls.

		0		OFA		9						
Limestone	1	1985	910	LNB, OFA	No SCR	3152.455	0.1721	0.1683	NA	NA	NA	NA
Limestone	2	1986	957	LNB, OFA	No SCR	3916.897	0.181	0.1748	NA	NA	NA	NA
Martin Lake	1	1977	793	LNB, OFA	No SCR	3046.537	0.1506	0.1444	NA	NA	NA	NA
Martin Lake	2	1978	793	LNB, OFA	No SCR	2869.374	0.112	0.1199	NA	NA	NA	NA
Martin Lake	3	1979	793	LNB, OFA	No SCR	3083.79	0.1197	0.1387	NA	NA	NA	NA
Oak Grove	1	2010	917	LNB, OFA	SCR	2297.183	0.0719	0.0726	Apr-22	0.0651	112%	YES
Oak Grove	2	2011	879	LNB, OFA	SCR	2294.112	0.0716	0.0723	Feb-22	0.069	105%	YES
Pirkey (H W Pirkey)	1	1985	721	LNB, OFA	No SCR	2949.843	0.1757	0.1756	NA	NA	NA	NA
San Miguel	1	1982	410	LNB, OFA	No SCR	2017.502	0.153	0.157	NA	NA	NA	NA
Sandy Creek Energy Station	1	2013	1008	LNB, OFA	SCR	1249.286	0.0562	0.0537	Dec-21	0.0395	136%	NO
Tolk	1	1982	568	LNB, OFA	No SCR	1272.806	0.2062	0.1901	NA	NA	NA	NA
Tolk	2	1985	568	LNB, OFA	No SCR	1242.201	0.1469	0.1479	NA	NA	NA	NA
Twin Oaks Power One	1	1990	175	OFA, SNCR	No SCR	1099.546	0.0948	0.1398	NA	NA	NA	NA
Twin Oaks Power One	2	1991	175	OFA, SNCR	No SCR	909.979	0.0845	0.1414	NA	NA	NA	NA
W A Parish	5	1977	734	LNB, OFA	SCR	1180.253	0.0635	0.0645	Apr-20	0.0499	129%	NO

W A Parish	6	1978	734	LNB, OFA	SCR	1285.15	0.0641	0.0632	Mar-18	0.047	134%	NO
W A Parish	7	1980	515	LNB, OFA	SCR	957.878	0.0578	0.0643	Nov-18	0.04	161%	NO
W A Parish	8	1982	654	LNB, OFA	SCR	384.467	0.0502	0.0585	Apr-19	0.0388	151%	NO
Welsh	1	1977	558	LNB, OFA	No SCR	2400.91	0.1762	0.1782	NA	NA	NA	NA
Welsh	3	1982	558	LNB, OFA	No SCR	2295.03	0.199	0.2049	NA	NA	NA	NA

Indeed, the following tables, excerpted from the Sahu Report and from Exhibit 3, reflect NOx rates for WA Parish 6, 7, and 8; JK Spruce 2; and Sandy Creek Unit 1, that demonstrate that for many Texas coal fired EGUs equipped with SCR the units simply are not operating their SCRs consistent with their lowest demonstrated monthly NOx rates. This is true even during ozone season. The Sahu Report and Exhibit 3 provides a more comprehensive analysis of Texas EGUs NOx rates that indicate they are not properly utilizing their SCRs. Nor is the poor NOx reduction of the SCRs a product of low capacity factor and minimum operating temperatures, as reflected in the comparisons of capacity factors and NOx rates excerpted below and included in both the Sahu Report and Exhibit 3.

WA Parish Units 6, 7, 8

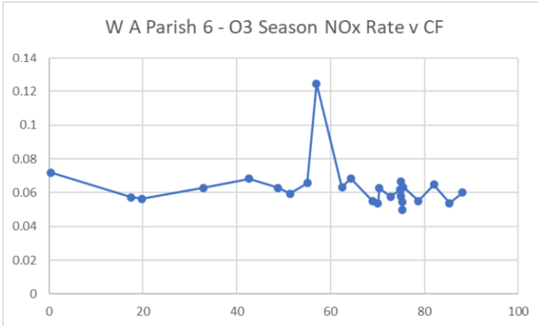
Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max O3 Months
W A Parish, TX	6	734	0.047	0.1312	0.1246
	7	615	0.04	0.0976	0.0731
	8	654	0.0388	0.0846	0.0522

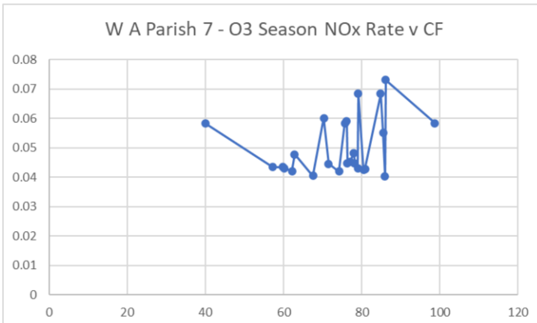
JK Spruce Unit 2

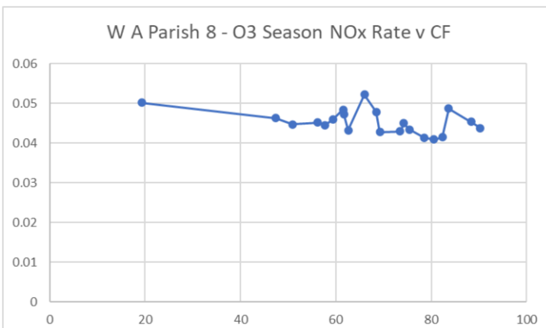
Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
JK Spruce	2	878	0.0313	0.0695	0.0537

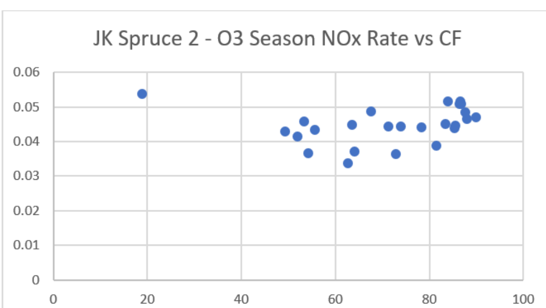
Sandy Creek Unit 1

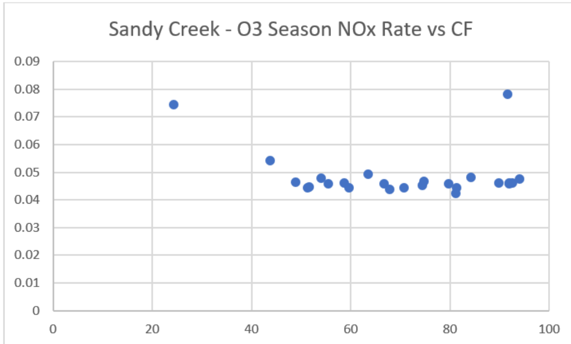
Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Sandy Creek	1	1008	0.0395	0.0782	0.0782


W A Parish 6 - O3 Season NOx Rate v CF
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0
20
40
60
80
100


W A Parish 7 - O3 Season NOx Rate v CF
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
20
40
60
80
100
120


W A Parish 8 - O3 Season NOx Rate v CF
0.06
0.05
0.04
0.03
0.02
0.01
0
0
20
40
60
80
100


JK Spruce 2 - O3 Season NOx Rate vs CF
0.06
0.05
0.04
0.03
0.02
0.01
0
0
20
40
60
80
100



EPA's own actions demonstrate that SCRs must be effectively used, and mere installation is insufficient to comply with RACT requirements. For example, in August 2022, EPA issued a RACT FIP for Pennsylvania requiring NOx emissions levels for coal fired EGUs consistent with more efficient operation of installed SCRs.[125] Using the third-best ozone performance of units with SCR installed, the FIP established new 30-day rolling average per facility and daily mass limits per unit for NOx emissions. The 30-day facility limits are between 0.072 and 0.102 lb/MMBtu.[126]

EPA's Pennsylvania FIP followed Sierra Club litigation in the Third Circuit resulting in an order requiring a compliant SIP or FIP for RACT requirements.[127] In particular, the court held that RACT "is not designed to rubber-stamp existing control methods. It is a technology-forcing mechanism."[128] According to the court, the prior EPA-approved SIP in Pennsylvania failed to impose adequate NOx emissions limits compliant with RACT requirements.[129] The Third Circuit holding and resulting FIP further support the argument that RACT requires effective use of SCRs.

Accordingly, Texas must ensure in its SIP that EGUs such as WA Parish actually use installed NOx emissions reduction technology to reach attainment with the ozone NAAQS, particularly given the significant impact of WA Parish on ozone nonattainment. Effective use of control technology is likewise required to address the problem of high ozone emissions on high electric demand days.

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[125] Federal Implementation Plan Addressing Reasonably Available Control Technology Requirements for Certain Sources in Pennsylvania, 87 Fed. Reg. 53,381 (Aug. 31, 2022), https://www.govinfo.gov/content/pkg/FR-2022-08-31/pdf/2022-18669.pdf.
[126] *Id.* at 53,403.
[127] Sierra Club v. EPA, 972 F.3d 290, 309 (3rd Cir. 2020).
[128] *Id.* at 295; *see also id.* at 309 (ordering the EPA to "approve a revised, compliant SIP within two years or formulate a new federal implementation plan. That proposal must be technology forcing, in accord with the agency's RACT standard").
[129] *Id.* at 293.

5. Conclusion for RACT: Texas Must Revise and Implement its Moderate and Severe Nonattainment SIPs to Address the Public Health Impacts of Ozone Emissions.

Texas is legally bound to revise and implement its moderate and severe nonattainment SIPs to bring all of Texas into attainment with minimum federal NAAQS ozone levels. In particular, Texas must impose emission limits for NOx equivalent to SCR controls on coal fired EGUs to reduce ozone emissions and their public health harms, and directly address the role that coal fired EGUs play in causing ozone exceedances on High Energy Demand Days. This action is essential given the adverse and unjust health impacts of unsafe ozone levels that exceed minimum NAAQS, including in particular for residents living in urban and environmental justice communities. Coal fired EGUs have a modeled impact on ozone nonattainment which must be addressed in Texas SIP revisions to protect the public health of Texas residents. Therefore, Texas must act to revise and implement its moderate nonattainment SIPs and bring all of Texas into attainment with minimum federal NAAQS ozone levels.

C. At a Minimum, TCEQ Must Impose Emission Limitations on Texas Coal Plants to Meet the Clean Air Act's Reasonably Available Control Measure Requirements.

As demonstrated above, and as required by the Clean Air Act, TCEQ must implement RACT at the Texas coal-fired EGUs as expeditiously as practicable. Moreover, as discussed, TCEQ's proposal to defer any RACT revisions to a future rulemaking is unlawful, and EPA cannot approve it.[130] If TCEQ refuses to implement RACT, however, the proposed SIPs must still be revised to include reasonably available control measures to reduce NOx emissions from Texas's coal-fired power plants. As the Sonoma Modeling Report demonstrates, Texas coal EGUs are significant anthropogenic contributors to numerous violating monitors in the DFW, HGB, and Bexar County areas. Reducing emissions from those coal plants would, in several cases in DFW and HGB, be sufficient to bring several monitors into compliance with the NAAQS.

The fact that several coal plants are outside the nonattainment area boundaries is of no moment. As noted, TCEQ has used emission limits of sources outside the DFW nonattainment area, including measures to control electric generating units, to advance attainment. The East Texas Combustion Sources Rule, for example, 30 TAC Chapter 117, Subchapter E, Division 4 explains, "[m]easures implemented to reduce ozone in the DFW nonattainment area although controls not applicable in the DFW nonattainment area[.]" SIP 4-3.

[130] *See* 42 U.S.C. §§ 7410(c)(1), 7502(c)(1); 7511a(b).

TCEQ's definition of RACM as only measures that could be fully implemented by the attainment deadline is based on the flawed assumption that DFW, HGB, and Bexar County will attain by 2024, using a 2023 attainment year. But, as demonstrated above, there is no evidence that that is the case. In fact, TCEQ's own modeling demonstrates that none of the areas in question will attain by August or September 2024. Therefore, all measures that reduce ozone levels in DFW, HGB, or Bexar County areas that meet the other requirements for RACM, *e.g*. are technologically and economically feasible, must be included in the SIP revisions as RACM.

Moreover, TCEQ's interpretation of RACM produces absurd results. If a state cannot include in their SIP revision reasonably available control measures that will indisputably advance attainment simply because there is not enough time to implement those measures, states like Texas and regulated entities would have a perverse incentive to delay revising their SIP as long as possible. After all, why impose RACM when a state can simply wait and run out the clock on meeting an attainment deadline, and then claim that it is too late to require emission reductions that are indisputably available and cost effective?

Here, TCEQ can and should create a RACM measure which decreases the ozone season NOx emissions from the Texas coal plants. The NOx emission limit should require a 40% reduction from the 2022 ozone season average uncontrolled tons per day rate. By "uncontrolled" we mean excluding reductions that were achieved by SNCR but not excluding reductions which were achieve by combustion controls such as low NOx burns or overfired area. This first mass limit should commence, at the latest, on March 1, 2024. The NOx emission limit should increase to a 60% commencing on March 1, 2025 and a final limit based on an 80% reduction commencing on March 1, 2026. This would give the power plant owners more than 36 months to complete installation of SCR (or hybrid SNCR/SCR systems) on all units. The 80% reduction is based on TCEQ's statements that SCR can achieve 80% reduction. The fact that SCR can actually achieve 90% reduction will provide the power plant owners additional flexibility in complying with this emission limit. Such a limit will advance DFW, HGB, and Bexar County attainment beyond the current path of persistent nonattainment. Other states have taken a similar approach. For example, Georgia has imposed a mass-based emission limit on coal fired power plants outside of Metro-Atlanta ozone nonattainment area.[131]

Controlling NOx emissions from coal plans would help with numerous other requirements of the Clean Air Act, is an efficient approach to environmental regulation, and is mandated by Section 110 of the Clean Air Act. EPA's regulations

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[131] *See* Ex. 7 at 4, Condition 3.2.3. The authority for Condition 3.2.3 is Georgia Regulation 391-3-1-.03(8)(c)15 which is entitled "Additional Provisions for Electrical Generating Units Located in Areas Contributing to the Ambient Air Level of Ozone in the Metropolitan Atlanta Ozone Non-Attainment Area.

encourage a multi-pollutant approach. 80 Fed. Reg. 12,264. Creating new emission limits for the Texas coal plants will not only satisfy RACM for the 2008 ozone NAAQS, it will also help TCEQ and Texas to comply with numerous other environmental protection measures. Thus, one rulemaking process establishing emission limits for the Texas coal units can satisfy numerous obligations TCEQ has or will have. For example, new emissions limits for the East Texas Five can satisfy Texas' obligation under the 2008 ozone NAAQS Good Neighbor provision, *i.e.* 42 U.S.C. § 7410(a)(2)(D)(i)(I).

Not only does developing RACM rules now to attain the 2015 ozone NAAQS make sense from a government efficiency point of view, it is actually mandated by the Clean Air Act. 42 U.S.C. § 7410(l) provides that EPA cannot approve a SIP if it would interfere with any applicable requirement concerning attainment and reasonable further progress or any other applicable requirement. An applicable requirement concerning attainment is that attainment must be achieved as expeditiously as practicable. TCEQ can set RACM emission limits for the 2008 ozone NAAQS which allows DFW to attain the 2015 NAAQS. TCEQ's failure to set RACM emission limits will interfere with DFW's ability to attain the 2015 NAAQS as expeditiously as practicable and thus violate 42 U.S.C. § 7410(l). Finally, the second compliance period for the Regional Haze program begins in 2018. Again, RACM emission limits for the Texas coal units and other sources can also be used to fulfill Texas' obligations with regard to reasonable progress for the second compliance period for the Regional Haze program as well as Texas' obligation under 42 U.S.C. § 7410(a)(2)(D)(i)(II)(prong 4) with regard to the 2015 ozone NAAQS.

D. TCEQ Should Apply the RACT to Sources Outside the Nonattainment Areas, which Contribute to Violations of the NAAQS.

As discussed, under section 172(c)(1) of the Clean Air Act, 42 U.S.C. 7502(c)(1), TCEQ is required to "provide for the implementation of all reasonably available control measures . . . (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 "as expeditiously as practicable." Moreover, 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."[132]

Under section 172(c) of the Clean Air Act, 42 U.S.C. § 7502(c), the DFW, Bexar County and Houston nonattainment areas should have attained compliance

[132] 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 (emphasis added).

with the 2015 eight-hour ozone standard of .070 ppm by August 3, 2021, which it failed to do. The DFW and the Houston area are similarly likely to fail to meet the attainment deadline for the 2015 ozone NAAQS, as is the Bexar County nonattainment area.

Given the Clean Air Act's requirement under these circumstances to implement "all reasonably available control measures" as expeditiously as practicable, and in light of monitoring demonstrating that the DFW, HGB, and Bexar County areas will fail to meet their respective attainment deadlines, TCEQ should consider obvious and available NOx and VOC emission reduction measures that will reduce ozone pollution in those areas—namely, applying the NOx and VOC RACT Regulations to oil and gas sources throughout the state. As TCEQ has recognized in other contexts, VOC pollution from Texas oil and gas sources are a contributing cause of ozone NAAQS violations in the DFW area.[133] Many of those oil and gas sources are upwind of the DFW area on high ozone days, and contribute significantly to ozone nonattainment in the DFW area.[134] Oil and gas production facilities similarly contribute to ozone exceedances in the Houston and San Antonio areas. As such, TCEQ must evaluate the possibility of applying the VOC RACT regulations to oil and gas sources across the state that are contributing to nonattainment in and around the DFW, Houston, and San Antonio areas.[135]

The fact that some oil and gas sources are physically outside the DFW or Houston nonattainment area boundaries does not preclude TCEQ from applying the RACT regulations to those sources. In similar contexts, TCEQ has used emission limits of sources outside the DFW nonattainment area, including measures to control electric generating units, before. For example, TCEQ lists Utility Electric Generation in East and Central Texas, 30 TAC Chapter 117, Subchapter E, Division 1 as one of the existing measures to control ozone in the DFW nonattainment area.[136] TCEQ also lists East Texas Combustion Sources Rule, 30 TAC Chapter 117, Subchapter E, Division 4 as another measure and explains: "Measure implemented to reduce ozone in the DFW nonattainment area although controls not applicable in the DFW nonattainment area[.]"[137] TCEQ certainly has authority to apply the VOC RACT regulations to any source in Texas that contributes to ozone nonattainment.

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[133] See, e.g., Dallas-Fort Worth 2008 Eight-Hour Ozone Nonattainment Area Demonstration State Implementation Plan ("2013 SIP") Revision at 3-75, SIP Project No. 2013-015-SIP-NR.
[134] Technical Support Document DFW-MOAAD at 23 (recognizing that upwind emissions in East Texas contribute approximately 13% of ozone in DFW area); EPA Feb. 2015 Comments at 2; SIP 5-3.
[135] *Sierra Club v. E.P.A.*, 294 F.3d 155, 163 (D.C. Cir. 2002) (approval of SIP revision arbitrary and capricious where failed to consider whether any particular measures fell within the definition of RACM, and failed to evaluate those measures).
[136] 2013 SIP 4-2.
[137] *Id*. at 4-3.

Applying the RACT regulations to oil and gas sources outside the DFW and Houston areas, but which contribute to nonattainment, will not only expedite attainment, but it will also help TCEQ and Texas to comply with numerous other environmental protection obligations, including:

- Applying the RACT regulations to oil and gas sources outside of DFW and Houston, and in the Permian Basin specifically, could help satisfy Texas' obligation under the 2008 and 2015 ozone NAAQS Good Neighbor provision, *i.e.* 42 U.S.C. § 7410(a)(2)(D)(i)(I).

- Applying the RACT regulations to oil and gas sources outside of DFW and Houston could also help avoid a nonattainment designation for the El Paso area and other parts of the Permian Basin, including areas of New Mexico. That in itself would be a serious accomplishment for TCEQ. After decades of being under federal mandates, this would provide Texas with considerably more discretion and would save TCEQ considerable resources.

- It is also worth noting that the second compliance period for the Regional Haze program begins in 2021. Applying the RACT regulations to oil and gas sources throughout Texas could help (although it is not, by itself, sufficient to) fulfill Texas's obligations with regard to reasonable progress for the second compliance period for the Regional Haze program as well as Texas' obligation under 42 U.S.C. § 7410(a)(2)(D)(i)(II)(prong 4) with regard to the 2015 ozone NAAQS.

1. <u>RACM for the Houston-Galveston-Brazoria Nonattainment Area</u>

The Houston area has a long history of failing to timely attain ozone standards, indicating that existing measures fall short of constituting RACM. To improve public health by reducing emissions of ozone-forming precursors beyond existing levels, TCEQ must move expeditiously to strengthen control measures and make a timely SIP submission.

In 2022, TCEQ refused to consider the proposed measures on the grounds that they were not RACM because they could not advance attainment by the proposed date: January 2023. But the reason why they would not have advanced attainment was because TCEQ had fallen behind on developing its RACM SIP. That excuse is not available now. Again, TCEQ's existing regulatory framework has repeatedly proven itself inadequate to result in timely attainment, and thus must be strengthened.

Importantly, TCEQ must adopt RACT as part of RACM, meaning that the 2019 comments' RACT analysis also applies here.[138] Thus, TCEQ cannot rely

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[138] *See* 83 Fed. Reg. 62,998, 63,007 (Dec. 6, 2018) ("EPA interprets the RACM provision to require a demonstration that an air agency has adopted all reasonable measures (including

reflexively on EPA's badly outdated CTG and RACT documents, but must instead rationally analyze whether improvements are indeed "reasonably available."[139]

Three refineries and chemical plants, in particular, account for the area's substantial NOx and VOC emissions.[140] At these sources, NOx emissions result from fuel combustion units, and to perform a rational RACM analysis, TCEQ must identify NOx emission rates for these units, existing controls, and emission rates with better technically feasible controls.[141] Depending on the source type, controls that TCEQ must consider for refineries across the board are—for boilers, heaters, and furnaces— "a combination of ultra-low NOx burners/FGR/SNCR or ultra-low NOx burners/SCR," and, for turbines, "dry low NOx combustors followed by SCR."[142] For VOCs, large amounts of emissions are fugitive.[143] TCEQ must consider, for cooling towers, "enhanced surveillance to ensure that no hydrocarbons leak into cooling water (i.e., via better maintenance, or proactive replacement of equipment)," and for valves, pumps, and the like, improved leak identification and repair measures, relying on, for example, optical gas imaging and other similar leak detection mechanisms.[144]

For VOC emissions from flares—another significant source of VOC emissions[145]—TCEQ must consider requiring alternatives to flaring or, if flaring remains necessary, improved flare efficiency. Further, as malfunction events too often result in massive emissions of ozone-forming precursors, TCEQ must consider requiring more effective, and proactive, maintenance as a control measure to reduce the frequency and severity of malfunction events.

Finally, for VOC emissions from storage tanks at refineries, TCEQ must consider requiring vapor pressure products above a particular threshold vapor pressure to "be stored in internal floating roof or fixed roof tanks – connected to a vapor recovery or vapor control system with a specified (and verifiable) capture and/or control efficiency of at least 99%," such as carbon absorbers and concentrators and/or catalytic or regenerative thermal oxidizers.[146]

RACT) to meet RFP requirements and to demonstrate attainment as expeditiously as practicable").

[139] *Id.* at 63,007-08 ("EPA requires that air agencies consider all available measures, including those being implemented in other areas").

[140] *Id.* at 17; *See also* Sahu Report on Ozone Non-Attainment Coal Units, Ex. 2.

[141] *Id.*

[142] *Id.* at 18.

[143] *Id.*

[144] *Id.*

[145] *Id.* at 19 tbl.4

[146] *Id.* at 20 & n.22.

2. The Bexar County Plan Must Achieve 15% VOC Reductions

As noted in the Bexar County RFP plan,[147] the plan for initial Moderate ozone nonattainment areas must achieve 15% VOC emission reductions.[148] Unlike RFP for areas that have previously had an RFP plan approved, the plan cannot substitute NOx emission reductions for VOC emission reductions.[149] However, the Bexar County RFP plan relies on this improper substitution.[150]

This 15% VOC emission reduction requirement will not disappear when the area is reclassified to Serious.[151] TCEQ's next plan, whether to remedy the deficiencies in this Moderate area plan or to meet Serious area requirements—or both—must achieve 15% VOC emission reductions. An obvious starting point would be oil and gas production sources, which anyway are covered by a CTG and therefore separately required to be controlled. EPA's CTG dates to 2016 and does not reflect the most cost-effective RACT controls. Furthermore, methane emissions from these sources will need to be controlled under section 111(d); EPA's proposed presumptive standards are more up-to-date.

3. TCEQ Should Consider Urban Planning Such as Increased Greenspaces and Walkable Areas in its Proposal to Meet Emission Limits

Trees and greenspaces provide benefits such as reducing air temperature which alters pollution concentrations, reduces energy consumption in buildings, and directly removes pollutants from the air. They can also lead to overall health benefits, energy savings, and air quality improvement. Because trees help to filter air borne pollutants such as SO_2 and NOx it can lead to decreased emissions from power generation facilities.[152] A study conducted in Philadelphia found that an increased tree canopy could reduce ozone and particulate pollution levels enough to

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[147] Bexar County Moderate Area Reasonable Further Progress State Implementation Plan Revision for the 2015 Eight-Hour Ozone National Ambient Air Quality Standard ("Bexar RFP Plan"), at 1-2.
[148] 40 C.F.R. § 51.1410(a)(4); 42 U.S.C. § 7511a(b)(1).
[149] *Compare* 40 C.F.R. § 51.1410(a)(2).
[150] Bexar RFP Plan at 1-2.
[151] 42 U.S.C. § 7511a(c) ("each State in which all or part of a Serious Area is located shall, with respect to the Serious Area (or portion thereof, to the extent specified in this subsection), make the submissions described under subsection (b) of this section (relating to Moderate Areas)").
[152] Air Pollution Removal by Urban Forests, National Park Service, available at https://www.nps.gov/articles/000/uerla-trees-air-pollution.htm#:~:text=Tiny%20pores%20on%20tree%20leaf,converted%20when%20inside%20the%20leaf.

significantly reduce mortality, hospital admissions, and work loss days.[153] A 2007 U.S. Forest Service report on the benefits of urban forests in Philadelphia found that the existing forest cover in the city removed .33% of the annual mean ozone and .38% of the annual mean particulate matter (PM10) from the air. [154] Additionally, walkable greenspaces, and more walkable areas in general -including sidewalks in suburban areas, would help to air quality as it could mean less cars on the road.

There are fewer and fewer green spaces in Houston and even then, they have been documented to be disproportionately in high income neighborhoods. For example, in 2021, the Kinder Institute at Rice found that the neighborhood of West University Place (median household income of $190, 000 in 2021) had 38% tree shade, covering 44% of the census tract at 4124 and helped to lower the average temperature to 83 degrees.[155] However, just 5 miles away the area of Gulfton found that one section of the area (median household income of $31, 000 in 2021) had only 6% tree shade with an average temperature of 90 degrees and another section (median household income of $39, 000 in 2021) had only 4% of tree shade with an average temperature of 91 degrees .[156]

There is an even greater proportionate difference when considering that trees, and walkable pathways like sidewalks, are less likely to be found in poorer areas where the residents rely more on transportation by foot or by public transit. A former Kinder Institute research fellow in 2019 pointed out that while Gulfton had less than 7% average tree cover that roughly 8% of workers relied on transit and 13% of households did not have access to a car, where as the River Oaks neighborhood (median income of $194, 487 in 2021)[157] had 49-50% tree cover while less than 2% of residents relied on public transportation to work.

By putting in efforts to remedy the lack of tree cover in lower-income neighborhoods TCEQ would not only be taking steps to mitigate harms caused to overburdened communities, but would have the added benefit of addressing pollution concerns with a more equitable and wider distribution of tree and

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[153] Neukrug et al, A Triple Bottom Line Assessment of Traditional and Green Infrastructure Options for Controlling CSO Events in Philedelphia's Watersheeeds, Status Consulting, Appendix H, August 24, 2009, available at https://www.epa.gov/sites/default/files/2015-10/documents/gi_philadelphia_bottomline.pdf

[154] *Id.* at H-2

[155] Andy Olin, Rice University Kinder Institute for Urban Research, Trees battle Houston's brutal heat, but many poorer areas are left unshaded, July 16, 2021, available at https://kinder.rice.edu/urbanedge/trees-battle-houstons-brutal-heat-many-poorer-areas-are-left-unshaded#:~:text=Only%20about%2018%25%20of%20Houston,trees%20need%20to%20be%20planted.

[156] *Id.*

[157] City Data, River Oaks, available at https://www.city-data.com/neighborhood/River-Oaks-Houston-TX.html

vegetation coverage. In addition, improving infrastructure to allow lower-income areas to become more walkable would also help to control emissions limits as more people being able to walk and take public transit would lower mobile source emissions.

IV. CONCLUSION

Sierra Club realizes that ensuring NAAQS attainment as expeditiously as practicable, as required by the Clean Air Act, is technically complicated and fraught with difficult political choices, and we appreciate the opportunity to submit these comments on TCEQ's attainment demonstration state implementation plan for the 2015 ozone NAAQS. As explained above, the proposed attainment demonstration is fundamentally flawed. Perhaps most important, TCEQ's own modeling makes clear that neither the DFW, HGB, nor Bexar County areas will attain the NAAQS by the required 2024 compliance date. Moreover, TCEQ failed to include any analysis of reasonably available control technology for the largest and most persistent contributors to ozone nonattainment. As a result, the proposed SIP revisions cannot be approved by EPA.

For more than 45 years, TCEQ has failed to fulfill its obligation to protect the public from the deleterious human health and economic impacts of ozone pollution. In light of the long history of ozone nonattainment in the DFW and HGB areas, in particular, the plain language and purpose of the Clean Air Act, and TCEQ's *own* modeling demonstrating that its proposed SIP fails to ensure compliance with ozone standards, we respectfully urge TCEQ to adopt all reasonably available control measures to bring the DFW, HGB, and Bexar County areas into attainment as expeditiously as practicable. In particular, TCEQ must re-evaluate and include SCR technology or mass-based emission limits for Texas coal plants and oil and gas sources. We look forward to productively participating in further conversations with the TCEQ and EPA Region 6 on this issue.

Sincerely,

Joshua Smith
Staff Attorney
Dru Spiller
Sierra Club
2101 Webster Street, Suite 1300

Oakland, CA 94612

Technical Memorandum

March 2, 2023 STI-1922078-TM

To: Josh Stebbins, Sierra Club

From: Lynn Alley and Kenneth Craig, Sonoma Technology

Re: Analysis of Air Quality Impacts from Coal-Fired EGUs on Ozone Nonattainment areas in Colorado, Indiana, Kentucky, Missouri, and Texas

Introduction and Summary

Sonoma Technology performed source apportionment modeling using the Comprehensive Air Quality Model with Extensions (CAMx) with Ozone Source Apportionment Technology (OSAT) to support the Sierra Club in evaluating ozone impacts from coal-fired power plants and other emission sources on downwind receptors in nonattainment areas. The source apportionment modeling was conducted for the 2016 ozone season (April to October) for a domain covering the continental United States at 12-km spatial resolution, and results were compiled into a database with an online dashboard application that can be used for data mining and analysis.

The source apportionment modeling simulations relied on the U.S. Environmental Protection Agency (EPA) 2016v2 (2016fj_16j) modeling platform, which draws on emissions data from the EPA National Emissions Inventory and data developed by the National Emissions Inventory Collaborative.[1] This EPA modeling platform tends to underpredict maximum daily average 8-hr (MDA8) ozone concentrations for days when the MDA8 ozone is greater than or equal to 60 ppb. Modeling results for the monitoring sites included in this report generally follow this trend. Overall, EPA found that “the ozone model performance results for the CAMx 2016fj (2016v2) simulation are within or close to the ranges found in other recent peer-reviewed applications” and that “the model performance results demonstrate the scientific credibility” of the 2016v2 modeling platform” (U.S. Environmental Protection Agency, 2022b).

Biases in the modeled ozone concentrations can contribute to uncertainty in the source apportionment contribution results. To help mitigate this uncertainty, the source apportionment modeling results are used in a “relative” sense rather than an “absolute” sense where possible. For

[1] The National Emissions Inventory Collaborative is a partnership between state emissions inventory staff, multi-jurisdictional organizations, federal land managers, EPA, and others to develop a North American air pollution emissions modeling platform for use in air quality planning.

this report, relative source contributions were calculated based on a daily 8-hr average basis by multiplying the absolute modeled source contribution by ratio of the monitored concentration and the total modeled ozone value. This approach has been used in past ozone source apportionment modeling analyses (e.g., Craig et al., 2020) and is similar to methods used by EPA to calculate ozone source contributions from a photochemical grid model (U.S. Environmental Protection Agency, 2022b). Anchoring the modeled apportionment results to ambient monitoring data can help mitigate uncertainty associated with imperfect model performance (Foley et al., 2015; Jones et al., 2005). The EGU ozone source apportionment results in this report should be considered indicative of the types of ozone impacts that can be expected from these facilities. Additional details on the models, data, and methods used can be found in **Appendix A**.

The results from this source apportionment modeling were used to analyze impacts of emissions from several facilities with coal-fired electric generating units (EGUs) in Colorado, Indiana, Kentucky, Missouri, and Texas on air quality monitoring station (AQS) locations and in environmental justice (EJ) zip codes in state nonattainment areas. The collective impact of all coal-fired EGUs for selected facilities, and the individual impact of specific facilities/units that either under-utilize [2] or lack selective catalytic reduction (SCR) controls, were analyzed. Modeled contributions are shown on days when the monitored MDA8 ozone concentration exceeded the 2015 ozone standard (70 ppb) in moderate nonattainment areas and exceeded the 2008 ozone standard (75 ppb) in severe nonattainment areas.

In summary, the modeling results showed that on numerous days in 2016, emissions from selected coal-fired EGUs in each state (CO, IN, KY, MO, and TX) had combined impacts of greater than 1% of the NAAQS (i.e., impacts of 0.75 or 0.70 ppb) at AQS monitoring locations and EJ zip code receptors within ozone nonattainment areas. On many of these days, these significant EGU impacts coincided with days when monitored MDA8 ozone concentrations exceeded the ozone NAAQS. Some selected individual facilities with coal-fired EGUs also had impacts in nonattainment areas greater than 1% of the NAAQS on high ozone days. These facilities include Clifty Creek in IN, Mill Creek in KY, Labadie in MO, WA Parish in TX, and Limestone in TX.

2015 Moderate Ozone Nonattainment Areas

For each state of interest—Colorado, Kentucky, Indiana, Missouri, and Texas—collective modeled contributions from selected coal-fired EGUs within the state and modeled contributions from select individual facilities and units that under-utilize or lack SCR controls were evaluated. Impacts were analyzed on days when the observed MDA8 ozone concentration exceeded the 2015 ozone NAAQS of 70 ppb at AQS monitors located within a moderate nonattainment area in each state of interest. Modeled impacts were also evaluated at EJ zip codes in nonattainment areas on monitor exceedance days.

[2] A unit with a SCR that is not achieving the SCR's lowest demonstrated NO_x emissions capabilities. This is defined as a unit that is not operating within 25% of its lowest demonstrated 30 day NO_x emission rate.

Relative source contributions at monitoring locations are presented, with contributions that equal or exceed 1% of the NAAQS (0.70 ppb) highlighted in red and contributions that equal or exceed 0.5% of the NAAQS (0.35 ppb) highlighted in yellow. Relative source contributions from the model are calculated on an 8-hr average basis by multiplying the absolute modeled source contribution by the ratio of the monitored concentration and the total modeled ozone concentration. The resulting value gives a relative modeled contribution during a monitor exceedance day.

Modeled contributions at EJ zip codes in nonattainment areas are presented as absolute modeled concentrations since there are no ozone monitors at the EJ zip code locations. In **Appendix B**, tabular data for each state show monitoring MDA8 values compared with total modeled values on days when monitors exceeded the NAAQS.

Colorado

Impacts from all selected coal-fired EGUs in Colorado (with/without SCR controls) were evaluated at AQS monitors and at EJ zip codes located within Denver Metro/North Front Range, CO, 2015 moderate ozone nonattainment areas on days where the monitored MDA8 ozone concentrations in the nonattainment area exceeded the 70 ppb NAAQS.

Monitoring days in 2016 that exceeded 70 ppb in Colorado nonattainment areas were compared with total modeled values from all sources and are presented in **Table B-1** in **Appendix B**. Modeled contributions from the selected coal-fired facilities in Colorado on those days are shown in **Table 1**.

Table 1. Modeled impacts from selected coal-fired EGUs[1] in Colorado (with or without SCR) at AQS monitors and EJ zip codes in moderate ozone nonattainment areas on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Aspen Park	Chatfield State Park	DENVER - CAMP	HIGHLAND RESERVOIR	La Casa	NATIONAL RENEWABLE ENERGY LABS - NREL	ROCKY FLATS-N	Welby	WELCH	80216	80223
6/16	0.14	0.08	0.23	0.04	0.23	0.24	0.24	0.22	0.13	0.21	0.09
6/17		0.36				0.41			0.36	0.28	0.25
6/18							0.94			0.62	0.48
6/19						0.55				0.57	0.50
6/26						0.47	0.45			0.45	0.49
6/27	1.31	1.40	1.24	1.31	1.24	1.40	1.27		1.40	1.17	1.17
6/28						0.82	0.84			0.70	0.68
7/7		0.21				0.36	0.31		0.27	0.39	0.30
7/12						0.14	0.14			0.20	0.21
7/14	0.28	0.29		0.27		0.30			0.27	0.23	0.22
7/16		0.43		0.48		0.52	0.44		0.46	0.55	0.53
7/17		0.82								0.74	0.67
7/19		0.18								0.24	0.21
7/22		0.29		0.34						0.43	0.28
7/25		0.99				1.10	1.07		1.01	0.90	0.90
7/27		0.94	1.03	0.89	1.03	1.03	0.96		0.93	0.83	0.80
7/28		1.09								0.94	0.96
7/29		1.08				1.09			0.98	0.71	0.67

Date	Aspen Park	Chatfield State Park	DENVER - CAMP	HIGHLAND RESERVOIR	La Casa	NATIONAL RENEWABLE ENERGY LABS - NREL	ROCKY FLATS-N	Welby	WELCH	80216	80223
7/30	1.01	1.00				0.93			1.06	0.75	0.76
8/2						0.73	0.77			0.60	0.55
8/3	1.77	1.65				1.50	1.44		1.45	1.21	1.23
8/7						1.01				0.76	0.82
8/12		0.58				0.53			0.51	0.55	0.51
8/16							0.82			0.80	0.77

[1] Selected coal-fired EGUs in Colorado include: Cherokee, Comanche, Craig (Yampa), Rawhide, and Ray D Nixon

Indiana

Impacts from all selected coal-fired EGUs in Indiana (with/without SCR controls) were evaluated at AQS monitors and at EJ zip codes located within the Indiana portion of the Louisville, KY-IN, and Chicago, IL-IN-WI, 2015 moderate ozone nonattainment areas on days where the monitored MDA8 ozone concentrations in the nonattainment area exceeded the 70 ppb NAAQS.

Monitoring days in 2016 that exceeded 70 ppb in Indiana nonattainment areas were compared with total modeled values from all sources and are presented in Table B-2 in Appendix B. Modeled contributions from the selected coal-fired facilities in Indiana on those days are shown in Table 2.

Table 2. Modeled impacts from selected coal-fired EGUs[1] in Indiana (with/without SCR) at AQS monitors and EJ zip codes in moderate ozone nonattainment areas, on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are red, and values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are yellow.

Date	Charlestown State Park	Gary-IITRI	HAMMOND CAAP	New Albany	Ogden Dunes-Water Treatment Plant	VALPARAISO
4/17		0.64			0.66	
4/18	0.43					1.19
4/19	0.84					
4/20	0.19			0.15		
5/24						0.37
6/9	0.88			0.81		
6/10	0.28	<0.01		0.27	<0.01	<0.01
6/11	1.71			1.79		
6/13				0.20		
6/19						1.73
6/25				1.58		
7/21	0.09					
7/27			0.06			
8/3		0.73	0.67		0.78	
8/10			0.65			

[1] Selected coal-fired EGUs in Indiana include: Cayuga, Clifty Creek, F.B. Culley, Michigan City, Petersburg, and Warrick

Kentucky

Impacts from all selected coal-fired EGUs in Kentucky (with/without SCR controls) were evaluated at AQS monitors and at EJ zip codes located within the Kentucky portion of the Louisville, KY-IN, and Cincinnati, OH-KY, 2015 moderate ozone nonattainment areas on days where the monitored MDA8 ozone concentrations in the nonattainment area exceeded the 70 ppb NAAQS. Impacts were also assessed for the Mill Creek Power Facility for all units combined, including Units 1 and 2 (without SCR controls) and Units 3 and 4 (with SCR controls).

Monitoring days in 2016 that exceeded 70 ppb in Kentucky nonattainment areas were compared with total modeled values from all sources and are presented in **Table B-3** in **Appendix B**. Modeled contributions from the selected coal-fired facilities in Kentucky on those days are shown in **Table 3**. **Figure 1** shows the Mill Creek facility location and AQS ozone monitoring stations located in 2015 ozone moderate nonattainment areas. **Table 4** presents modeled contributions from the Mill Creek facility for all units combined, units without SCR, and units with SCR.

Table 3. Modeled Impacts from selected coal-fired EGUs[1] in Kentucky (with/without SCR) at AQS monitors in moderate ozone nonattainment areas on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Bates	BUCKNER	CANNONS LANE	NORTHERN KENTUCKY UNIVERSITY (NKU)	SHEPHERDSVILLE	Watson Lane
5/24		1.34	1.44	2.22		
6/3						0.74
6/10	2.54		4.10			
6/11	2.35	1.47	2.02	2.37		
6/13			0.42	0.22		2.25
6/25			2.45			
6/30	0.89		1.73			
7/19			0.89			
7/21			4.50			
7/23			4.29			
8/3			0.82			
9/14	0.56				0.88	0.68
9/23		0.86	0.52			
9/24	1.27		1.18			
9/25			1.50			

[1] Selected coal-fired EGUs in Kentucky include: E.W. Brown, Ghent, H.L Spurlock, J. Sherman Cooper, Mill Creek, Shawnee, and Trimble County

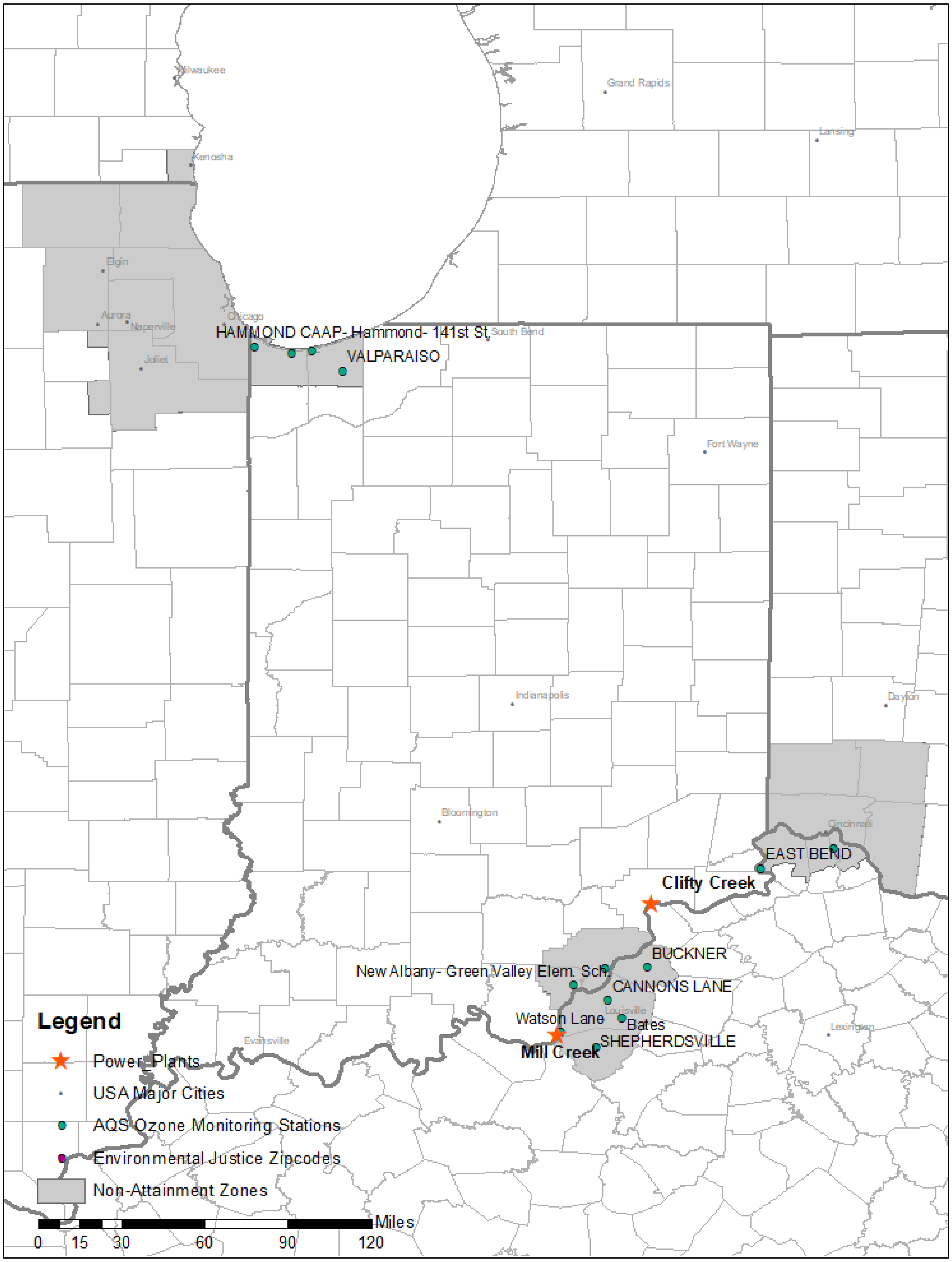

Figure 1. Kentucky Mill Creek facility location with AQS ozone monitoring locations that exceeded the NAAQS in 2015 ozone moderate nonattainment areas.

Table 4. Modeled impacts from Mill Creek, KY, facility at AQS monitors in moderate ozone nonattainment areas on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr modeled ozone contributions are relative values (ppb) at AQS monitors. Values from all units combined that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Contribution from Mill Creek sum of all units combined, (from Units 1 and 2 without SCR), [from Units 3 and 4 with SCR]

Date	Bates	BUCKNER	CANNONS LANE	NORTHERN KENTUCKY UNIVERSITY (NKU)	SHEPHERDSVILLE	Watson Lane
5/24		0.89 (0.82) [0.07]	1.04 (0.95) [0.08]	0.30 (0.28) [0.02]		
6/3						0.65 (0.55) [0.09]
6/10	2.04 (1.52) [0.52]		3.50 (2.59) [0.91]			
6/11	1.61 (1.08) [0.53]	0.61 (0.41) [0.20]	1.04 (0.70) [0.34]	0.09 (0.06) [0.03]		
6/13			0.11 (0.09) [0.02]			1.87 (1.46) [0.40]
6/25			1.42 (1.09) [0.32]			
6/30	0.55 (0.44) [0.11]		1.30 (1.03) [0.27]			
7/19			0.10 (0.07) [0.03]			
7/21			4.18 (3.41) [0.77]			
7/23			3.92 (2.87) [1.06]			
8/3			0.26 (0.21) [0.05]			
9/14	0.05 (0.04) [0.01]				0.49 (0.38) [0.11]	0.43 (0.33) [0.10]
9/23		0.63 (0.58) [0.05]	0.39 (0.35) [0.04]			
9/24	0.24 (0.21) [0.02]		0.23 (0.20) [0.02]			
9/25			0.72 (0.30) [0.42]			

Missouri

Impacts from all selected coal-fired EGUs in Missouri (with/without SCR controls) were evaluated at AQS monitors and at EJ zip codes located within the Missouri portion of the St. Louis, MO-IL, moderate ozone nonattainment area on days where the monitored MDA8 ozone concentrations in the nonattainment area exceeded the 70 ppb NAAQS. Impacts were also assessed for the Labadie Power Facility for all units combined, which include Units 1, 2, 3, and 4 (without SCR controls).

Monitoring days in 2016 that exceeded 70 ppb in Missouri nonattainment areas were compared with total modeled values from all sources and are presented in **Table B-4** in **Appendix B**. Modeled contributions from the selected coal-fired facilities in Missouri on those days are shown in **Table 5**. **Figure 2** shows the Labadie facility location, AQS ozone monitoring stations and EJ zip codes located in 2015 ozone moderate nonattainment areas. **Table 6** presents modeled contributions from the Labadie facility.

Table 5. Modeled impacts from selected coal-fired[1] EGUs in Missouri (with/without SCR) at AQS monitors and EJ zip codes in moderate ozone nonattainment areas on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Arnold West	Blair Street	Farrar	Maryland Heights	Orchard Farm	Pacific	West Alton	Zip 63031, 63042, 63044	Zip 63033	Zips 63103, 63104, 63106, 63107, 63108	Zips 63109, 63111, 63116, 63118, 63139	Zips 63112, 63113, 63115, 63120, 63133, 63147	Zips 63135, 63136, 63137, 63138	Zip 63801	Zip 63869
5/23					0.50		0.70	0.34	0.74	0.30	0.30	0.30	0.37	2.50	2.65
6/8				0.76				0.38	0.83	0.16	0.08	0.16	0.42	0.92	1.11
6/9							1.91	1.35	1.99	0.79	0.72	0.79	1.00	4.10	4.42
6/10			1.40				2.47	1.48	2.36	0.91	0.63	0.91	1.18	4.52	5.09
6/13							1.91	0.72	0.98	0.23	0.18	0.23	0.49	1.74	2.74
6/16				1.12				0.60	2.51	1.04	1.55	1.04	1.26	1.03	0.96
6/18	0.03			0.31	1.67	0.08	1.01	0.51	0.50	0.07	0.03	0.07	0.25	0.21	0.11
6/27						2.11		1.06	1.70	0.66	0.40	0.66	0.85	0.51	0.72
7/20				0.53				0.33	0.41	0.16	0.12	0.16	0.21	6.50	6.55
7/23				1.87				1.46	2.46	0.98	1.11	0.98	1.23	2.90	5.94
8/4					3.62		2.11	2.38	3.32	1.43	1.42	1.43	1.66	5.56	7.03
8/9	0.08	0.08		0.36			0.27	0.07	0.14	0.05	0.04	0.05	0.07	1.14	2.11
8/10					2.41		1.89	0.56	0.74	0.18	0.16	0.18	0.37	5.86	3.77
9/21					0.23			0.06	0.10	0.03	0.04	0.03	0.05	0.29	0.23
9/22					3.58		1.98	2.21	3.23	1.35	1.43	1.35	1.62	3.51	2.88
9/23		1.38			3.09		2.43	2.12	3.68	2.12	0.86	1.19	1.19	1.19	1.19
9/24					0.52		0.64	0.32	0.71	0.32	0.56	0.42	0.42	0.42	0.42

[1] Selected coal-fired EGUs in Missouri include: Hawthorn, John Twitty, Labadie, New Madrid, Sikeston, Sioux, and Thomas Hill

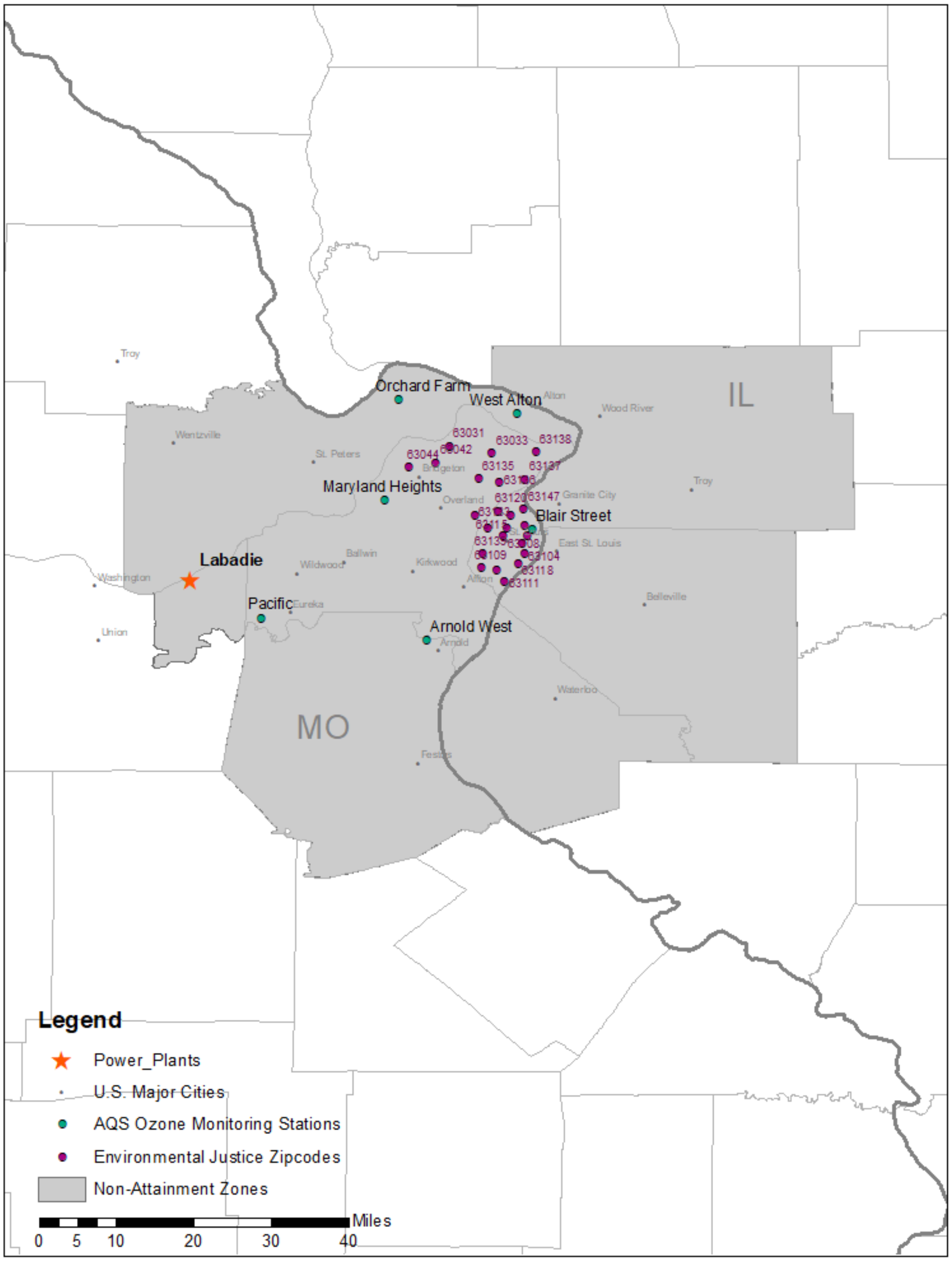

Figure 2. Missouri Labadie facility location with AQS ozone monitoring stations that exceeded the NAAQS and EJ zip codes located in 2015 ozone moderate nonattainment areas.

Table 6. Modeled impacts from **Labadie, MO**, facility (Units 1, 2, 3, 4 without SCR) at AQS monitors and EJ zip codes in moderate ozone nonattainment areas on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr modeled ozone contributions are relative values (ppb) at AQS Monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Arnold West	Blair Street	Farrar	Maryland Heights	Orchard Farm	Pacific	West Alton	Zip 63031, 63042, 63044	Zip 63033	Zip 63103, 63104, 63106, 63107, 63108	Zip 63109, 63111, 63116, 63118, 63139	Zip 63112, 63113, 63115, 63120, 63133, 63147	Zip 63135, 63136, 63137, 63138	Zip 63801	Zip 63869
5/23					0.22		0.21	0.12	0.26	0.08	0.06	0.08	0.13	0.02	0.02
6/8				0.57				0.01	0.01	0.01	0.01	0.01	<0.01	0.16	0.24
6/9							0.74	0.92	0.93	0.26	0.13	0.26	0.46	0.09	0.08
6/10			0.06				1.10	1.30	1.86	0.72	0.42	0.72	0.93	0.04	0.04
6/13							0.24	0.49	0.34	0.10	0.06	0.10	0.17	0.01	<0.01
6/16				0.48				0.04	0.06	0.17	0.81	0.17	0.03	<0.01	<0.01
6/18	<0.01			<0.01	<0.01	0.04	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.01
6/27						1.06		<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.13	0.16
7/20				0.48				0.27	0.20	0.08	0.03	0.08	0.10	0.06	0.09
7/23				1.35				0.67	0.89	0.44	0.52	0.44	0.45	0.03	0.02
8/4					1.87		0.43	1.19	1.05	0.65	0.65	0.65	0.53	0.06	0.05
8/9	0.04	0.04		0.31			0.03	0.05	0.05	0.02	0.02	0.02	0.02	0.01	0.01
8/10					0.34		0.06	0.08	0.10	0.04	0.03	0.04	0.05	<0.01	<0.01
9/21					0.12			0.02	0.03	0.01	0.01	0.01	0.02	<0.01	<0.01
9/22					1.50		0.28	0.56	0.35	0.09	0.04	0.09	0.18	<0.01	<0.01

Date	Arnold West	Blair Street	Farrar	Maryland Heights	Orchard Farm	Pacific	West Alton	Zip 63031, 63042, 63044	Zip 63033	Zip 63103, 63104, 63106, 63107, 63108	Zip 63109, 63111, 63116, 63118, 63139	Zip 63112, 63113, 63115, 63120, 63133, 63147	Zip 63135, 63136, 63137, 63138	Zip 63801	Zip 63869
9/23		0.91			2.51		1.40	1.64	2.58	0.79	0.46	0.79	1.29	<0.01	<0.01
9/24					0.24		0.02	0.03	0.02	0.01	<0.01	0.01	0.01	<0.01	<0.01

Texas

Impacts from all selected coal-fired EGUs in Texas (with/without SCR controls) were evaluated at AQS monitors and at EJ zip codes located within 2015 moderate ozone nonattainment areas (Dallas-Fort Worth, Houston-Galveston-Brazoria, and San Antonio) on days where monitoring concentrations exceeded the 70 ppb NAAQS. Impacts were also assessed for several individual facilities with coal-fired units that lacked or under-utilized SCR controls.

Monitoring days in 2016 that exceeded 70 ppb in Texas nonattainment areas were compared with total modeled values from all sources and are presented for the ozone nonattainment areas in **Appendix B** for Dallas-Fort Worth (**Table B-5)**, Houston-Galveston-Brazoria (**Table B-6**), and San Antonio (**Table B-7**). Modeled contributions from the coal-fired facilities in Texas on those days in each nonattainment area are shown in **Tables 7 through 9. Table 10** shows individual Texas facilities that have modeled contributions ≥ 0.5% of the NAAQS (0.35 ppb) on monitored 2016 NAAQS exceedance day/s. **Figure 3** shows locations of facilities listed in **Table 10**, AQS ozone monitoring stations, and EJ zip codes located in 2015 ozone moderate nonattainment areas. **Tables 11 through 19** present modeled contributions from the individual facilities in nonattainment areas where the facility had modeled contributions ≥ 0.5% of the NAAQS (0.35 ppb).

Table 7. Modeled impacts from all selected coal-fired EGUs[1] in Texas (with/without SCR) at AQS monitors and EJ zip codes in the Dallas-Fort Worth ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Eagle Mountain Lake	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/6		0.01											0.01	0.01
6/7	0.04	0.08	0.03	0.04		0.01	0.02		0.01	0.01	0.01		0.03	0.03
6/8					2.02							1.83	1.56	1.59
6/9					0.88							0.65	0.79	0.92
6/10					0.74								0.86	0.76
6/20			1.22		1.20				1.08				0.89	0.90
6/29										0.33			0.33	0.36
6/30					0.63			0.39	0.40			0.61	0.28	0.29
7/1					0.87			0.72	0.62			1.00	0.64	0.71
7/26							1.60			1.41			0.96	1.00
8/5								0.37				0.44	0.28	0.32
8/31		0.38											0.27	0.33
9/11			0.36										0.27	0.38
9/20									2.25				2.00	2.48
9/21					0.67				0.55				0.38	0.32
9/22					0.79							0.74	0.73	0.59
10/1								0.03				0.01	0.07	0.08
10/3		0.88			0.46								0.28	0.23

[1] Selected coal-fired EGUs in Texas include: Coleto Creek, Fayette, JK Spruce, Limestone, Martin Lake, San Miguel, Twin Oaks, Tolk, WA Parish, and Welsh

Table 8. Modeled impacts from all selected coal-fired EGUs[1] in Texas (with/without SCR) at AQS monitors and EJ zip codes in the Houston-Galveston-Brazoria ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Croquet	Houston Deer Park #2	Houston East	Houston Westhollow	Lake Jackson	Lang	Manvel Croix Park	Northwest Harris County	Zip 77469	Zip 77471	Zip 77479
4/3			0.31										0.48	0.47	0.44
4/5	0.44												0.33	0.26	0.72
4/7		0.54											0.36	0.27	0.84
4/14		0.37											0.79	0.87	0.70
4/15				0.27				0.26					0.78	0.55	0.35
4/23		0.06	0.09	0.29				0.54		0.13		0.35	1.58	1.56	1.20
4/27	0.39		0.61										0.28	0.22	1.50
5/4		0.66											0.37	0.37	0.26
5/6				0.94			0.60	1.04		0.67			2.04	1.77	1.47
5/7	0.25	<0.01	0.22										0.50	0.51	0.67
5/13				0.65				0.68					1.42	1.31	0.86
6/8		0.04			0.21			0.30					2.79	1.51	0.85
7/21			0.28							0.27		0.74	1.17	1.68	0.94
7/22			0.32										1.42	1.20	1.32
8/3			0.23										0.87	0.68	0.67
8/4	0.28												0.82	0.68	0.65
9/21					0.07								0.96	0.50	0.21
9/28						0.41					0.92		1.03	0.65	0.69
9/29									0.64				0.47	0.38	0.31
10/2					0.02						0.01		0.73	0.41	0.15
10/3								0.07					0.67	0.37	0.23
10/10								0.07					1.43	1.09	0.52
10/26			0.09										0.85	0.71	0.43

[1] Selected coal-fired EGUs in Texas include: Coleto Creek, Fayette, JK Spruce, Limestone, Martin Lake, San Miguel, Tolk, Twin Oaks, WA Parish, and Welsh

Table 9. Modeled impacts from all selected coal-fired EGUs[1] in Texas (with/without SCR) at AQS monitors and EJ zip codes in the San Antonio ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Calaveras Lake	Camp Bullis	San Antonio Northwest	Zip 78101	Zip 78112	Zip 78221	Zip 78223	Zip 78263	Zip 78264
5/5			0.16	0.33	0.56	0.38	0.37	0.33	0.62
5/6			1.64	1.43	1.03	1.53	1.58	1.43	1.09
9/28	0.46			0.28	0.20	0.09	0.14	0.28	0.13
10/2		1.56	1.50	2.13	2.32	2.43	2.44	2.13	2.49
10/11		1.06	1.04	1.30	1.28	1.09	1.21	1.30	1.24

[1] Selected coal-fired EGUs in Texas include: Coleto Creek, Fayette, JK Spruce, Limestone, Martin Lake, San Miguel, Tolk, Twin Oaks, TWA Parish, and Welsh

Table 10. Individual Texas facilities and units that have modeled contributions ≥ 0.5% of the NAAQS (0.35 ppb) on monitored 2016 NAAQS exceedance days

Facility	Modeled Units
WA Parish, TX	5, 6, 7, and 8 combined ('with SCR')
Fayette Power Project, TX	1, 2, and 3 combined ('No SCR')
JK Spruce, TX	1 ('No SCR') 2 ('With SCR') (contributions shown combined)
Limestone, TX	1, and 2 combined ('No SCR')
Martin Lake, TX	1, 2, and 3 combined ('No SCR')
Welsh, TX	1 and 3 combined ('No SCR')

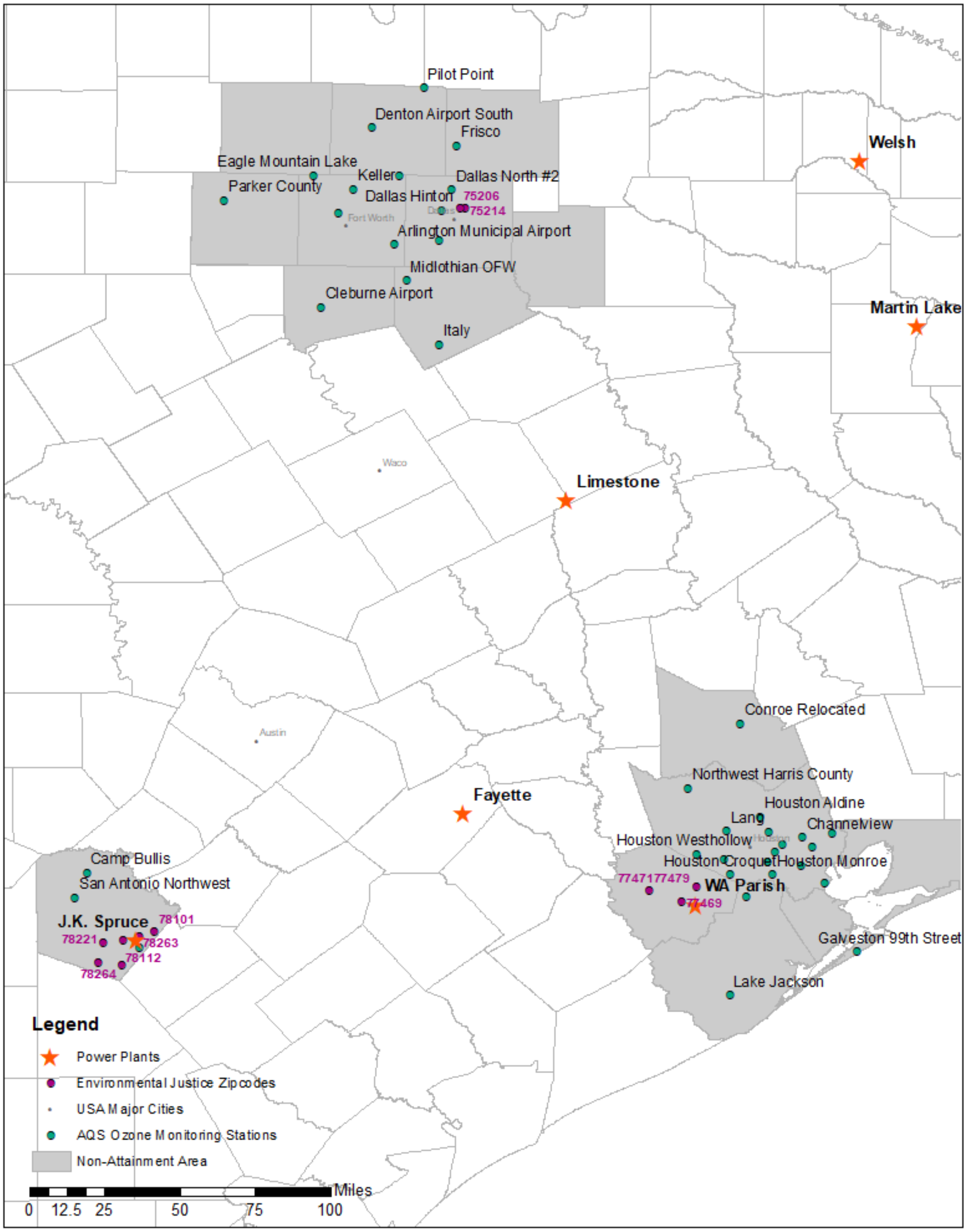

Figure 3. Facility locations with AQS ozone monitoring stations that exceeded that NAAQS and EJ zip codes located in 2015 ozone moderate nonattainment areas.

Table 11. Modeled impacts from WA Parish facility (Units 5, 6, 7, 8 combined, with SCR) at AQS monitors and EJ zip codes in the Houston-Galveston-Brazoria ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Croquet	Houston Deer Park #2	Houston East	Houston Westhollow	Lake Jackson	Lang	Manvel Croix Park	Northwest Harris County	Zip 77469	Zip 77471	77479
4/3			0.03										0.13	0.09	0.14
4/5	0.14												0.18	0.12	0.56
4/7		0.06											0.15	0.05	0.66
4/14		0.01											0.03	0.01	0.02
4/15				0.07				0.07					0.61	0.36	0.20
4/23		<0.01	0.01	0.20				0.46		0.05		0.27	1.49	1.48	1.12
4/27	0.29		0.58										0.27	0.20	1.48
5/4		0.11											0.02	<0.01	0.01
5/6				0.12			<0.01	0.32		0.02			1.33	1.11	0.78
5/7	0.06	<0.01	0.02										0.26	0.25	0.48
5/13				0.26				0.32					1.30	1.15	0.65
6/8		0.01			0.10			0.13					2.70	1.35	0.75
7/21			0.28							0.27		0.71	1.17	1.68	0.94
7/22			0.31										1.42	1.19	1.32
8/3			0.21										0.86	0.68	0.67
8/4	0.21												0.80	0.65	0.62
9/21					0.01								0.91	0.44	0.15

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Croquet	Houston Deer Park #2	Houston East	Houston Westhollow	Lake Jackson	Lang	Manvel Croix Park	Northwest Harris County	Zip 77469	Zip 77471	77479
9/28						0.08					0.54		0.58	0.08	0.26
9/29									0.18				0.12	<0.01	0.01
10/2					0.01						<0.01		0.73	0.40	0.14
10/3								0.05					0.65	0.36	0.22
10/10								0.06					1.43	1.09	0.52
10/26			0.01										0.81	0.66	0.38

Table 12. Modeled impacts from **Fayette** facility (Units 1, 2, 3 combined, without SCR) at AQS monitors and EJ zip codes in the Dallas-Fort Worth ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Eagle Mountain Lake	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/6		<0.01											<0.01	<0.01
6/7	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01		<0.01	<0.01	<0.01		<0.01	<0.01
6/8					<0.01							<0.01	<0.01	<0.01

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Eagle Mountain Lake	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/9					0.26							0.19	0.18	0.19
6/10					0.12								0.10	0.10
6/20			0.54		0.51				0.48				0.40	0.40
6/29										0.02			0.02	0.02
6/30					0.01			0.01	0.01			0.01	0.01	0.01
7/1					0.23			0.13	0.18			0.14	0.16	0.16
7/26							0.15			0.13			0.08	0.08
8/5								0.09				0.13	0.04	0.05
8/31		<0.01											<0.01	<0.01
9/11			<0.01										<0.01	<0.01
9/20									0.77				0.76	0.82
9/21					0.01				0.01				0.01	0.01
9/22					0.01							<0.01	0.01	<0.01
10/1								<0.01				<0.01	<0.01	<0.01
10/3		0.09			0.01								<0.01	<0.01

Table 13. Modeled impacts from JK Spruce facility (Unit 1, no SCR + Unit 2, with SCR combined) at AQS monitors and EJ zip codes in the San Antonio ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Calaveras Lake	Camp Bullis	San Antonio Northwest	Zip 78101	Zip 78112	Zip 78221	Zip 78223	Zip 78263	Zip 78264
5/5			0.16	0.33	0.55	0.38	0.36	0.33	0.60
5/6			0.81	0.65	0.13	0.71	0.79	0.65	0.15
9/28	0.42			0.25	0.16	0.05	0.11	0.25	0.09
10/2		0.58	0.61	1.28	1.46	1.61	1.62	1.28	1.62
10/11		0.23	0.11	0.76	0.54	0.31	0.56	0.76	0.29

Table 14. Modeled impacts from Limestone facility (Units 1, 2 combined, no SCR) at AQS monitors and EJ zip codes in the Dallas-Fort Worth ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Eagle Mountain Lake	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/6		<0.01											<0.01	<0.01

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Eagle Mountain Lake	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/7	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01		<0.01	<0.01	<0.01		<0.01	<0.01
6/8					0.86							0.63	0.48	0.39
6/9					0.02							0.07	0.28	0.40
6/10					0.47								0.64	0.54
6/20			0.06		0.21				0.11				0.04	0.04
6/29										0.03			0.02	0.02
6/30					0.39			0.05	0.22			0.12	0.07	0.04
7/1					0.37			0.35	0.20			0.62	0.14	0.20
7/26							0.71			0.51			0.33	0.30
8/5								0.02				0.02	0.05	0.07
8/31		<0.01											<0.01	<0.01
9/11			<0.01										<0.01	<0.01
9/20									0.65				0.56	0.73
9/21					0.23				0.22				0.13	0.07
9/22					0.55							0.36	0.52	0.34
10/1								<0.01				<0.01	0.02	0.02
10/3		0.50			0.33								0.20	0.12

Table 15. Modeled impacts from **Limestone** facility (Units 1, 2 combined, no SCR) at AQS monitors and EJ zip codes in the Houston-Galveston-Brazoria ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values do not equal or exceed 1% of the NAAQS (0.70 ppb). Values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Croquet	Houston Deer Park #2	Houston East	Houston Westhollow	Lake Jackson	Lang	Manvel Croix Park	Northwest Harris County	Zip 77469	Zip 77471	77479
4/3			0.19										0.18	0.19	0.17
4/5	0.04												0.04	0.04	0.04
4/7		0.44											0.14	0.09	0.13
4/14		0.23											0.57	0.65	0.51
4/15				0.12				0.10					0.10	0.11	0.09
4/23		0.01	<0.01	0.01				0.01		<0.01		0.01	0.02	0.02	0.01
4/27	<0.01		<0.01										<0.01	<0.01	<0.01
5/4		0.04											0.08	0.09	0.09
5/6				<0.01			<0.01	<0.01		<0.01			<0.01	0.01	<0.01
5/7	0.01	<0.01	0.01										0.03	0.04	0.02
5/13				0.13				0.12					0.05	0.06	0.07
6/8		<0.01			<0.01			<0.01					<0.01	<0.01	<0.01
7/21			<0.01							<0.01		<0.01	<0.01	<0.01	<0.01
7/22			<0.01										<0.01	<0.01	<0.01
8/3			<0.01										<0.01	<0.01	<0.01

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Croquet	Houston Deer Park #2	Houston East	Houston Westhollow	Lake Jackson	Lang	Manvel Croix Park	Northwest Harris County	Zip 77469	Zip 77471	77479
8/4	0.01												0.01	0.01	0.01
9/21					0.01								0.01	0.01	0.01
9/28						0.03					0.08		0.17	0.28	0.16
9/29									0.27				0.15	0.11	0.11
10/2					<0.01						<0.01		<0.01	<0.01	<0.01
10/3								<0.01					<0.01	<0.01	<0.01
10/10								<0.01					<0.01	<0.01	<0.01
10/26			0.01										0.01	0.01	0.01

Table 16. Modeled impacts from Limestone facility (Units 1, 2 combined, no SCR) at AQS monitors and EJ zip codes in the San Antonio ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values do not equal or exceed 1% of the NAAQS (0.70 ppb). Values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Calaveras Lake	Camp Bullis	San Antonio Northwest	Zip 78101	Zip 78112	Zip 78221	Zip 78223	Zip 78263	Zip 78264
5/5			0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
5/6			<0.01	0.35	0.35	0.34	0.35	0.35	0.35
9/28	<0.01			0.01	0.01	0.01	0.01	0.01	0.01

10/2		0.01	<0.01	0.07	0.08	0.10	0.08	0.07	0.09
10/11		<0.01	<0.01	0.01	0.01	0.01	0.01	0.01	0.01

Table 17. Modeled impacts from **Martin Lake** facility (Units 1, 2, 3 combined, no SCR) at AQS monitors and EJ zip codes in the Dallas-Fort Worth ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Eagle Mountain Lake	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/6		<0.01											<0.01	<0.01
6/7	<0.01	<0.01	<0.01	<0.01		<0.01	<0.01		<0.01	<0.01	<0.01		<0.01	<0.01
6/8					0.54							0.60	0.71	0.85
6/9					0.11							0.08	0.06	0.06
6/10					<0.01								<0.01	<0.01
6/20			0.04		0.07				0.06				0.04	0.04
6/29										0.09			0.08	0.10
6/30					0.20			0.30	0.15			0.42	0.17	0.22
7/1					0.05			0.06	0.04			0.07	0.05	0.05

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Eagle Mountain Lake	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
7/26							0.35			0.42			0.41	0.49
8/5								0.03				0.03	0.03	0.04
8/31		0.02											<0.01	<0.01
9/11			<0.01										<0.01	<0.01
9/20									0.11				0.24	0.49
9/21					0.36				0.27				0.21	0.22
9/22					0.18							0.36	0.16	0.23
10/1								<0.01				<0.01	<0.01	0.01
10/3		0.02			0.08								0.06	0.10

Table 18. Modeled impacts from Welsh facility (Units 1, 3 combined, no SCR) at AQS monitors and EJ zip codes in the Dallas-Fort Worth ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values do not equal or exceed 1% of the NAAQS (0.70 ppb). Values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Eagle Mountain Lake	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/6		0.01											0.01	0.01
6/7	0.03	0.06	0.03	0.04		0.01	0.02		0.01	0.01	0.01		0.03	0.03
6/8					0.38							0.42	0.35	0.34
6/9					0.02							0.02	0.01	0.01
6/10					<0.01								<0.01	<0.01
6/20			0.01		0.04				0.02				0.01	0.01
6/29										0.13			0.17	0.20
6/30					0.02			0.01	0.02			0.02	0.01	0.01
7/1					0.01			0.01	0.01			0.01	0.01	0.01
7/26							0.01			0.02			0.01	0.02
8/5								0.01				0.01	0.01	0.01
8/31		0.30											0.26	0.31
9/11			0.26										0.26	0.37

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Eagle Mountain Lake	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
9/20									0.01				0.02	0.04
9/21					0.02				0.02				0.01	0.01
9/22					<0.01							<0.01	<0.01	<0.01
10/1								0.02				0.01	0.04	0.05
10/3		<0.01			<0.01								<0.01	<0.01

Table 19. Modeled impacts from Welsh facility (Units 1, 3 combined, no SCR) at AQS monitors and EJ zip codes in the Houston-Galveston-Brazoria ozone nonattainment area on days in 2016 that exceeded the 2015 ozone NAAQS of 70 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.70 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.35 ppb) are highlighted in yellow.

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Croquet	Houston Deer Park #2	Houston East	Houston Westhollow	Lake Jackson	Lang	Manvel Croix Park	Northwest Harris County	Zip 77469	Zip 77471	77479
4/3			0.01										<0.01	<0.01	<0.01
4/5	<0.01												0.01	0.01	0.01
4/7		<0.01											<0.01	<0.01	<0.01

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Croquet	Houston Deer Park #2	Houston East	Houston Westhollow	Lake Jackson	Lang	Manvel Croix Park	Northwest Harris County	Zip 77469	Zip 77471	77479
4/14		0.02											0.03	0.03	0.02
4/15				0.01				0.01					0.01	0.01	0.01
4/23		0.03	0.06	0.07				0.06		0.06		0.05	0.04	0.04	0.05
4/27	<0.01		<0.01										<0.01	<0.01	<0.01
5/4		0.32											0.01	0.01	0.01
5/6				0.58			0.43	0.54		0.48			0.49	0.45	0.48
5/7	0.08	<0.01	0.08										0.07	0.07	0.06
5/13				0.08				0.07					0.02	0.03	0.05
6/8		0.01			0.02			0.03					0.02	0.03	0.02
7/21			<0.01							<0.01		<0.01	<0.01	<0.01	<0.01
7/22			<0.01										<0.01	<0.01	<0.01
8/3			<0.01										<0.01	<0.01	<0.01
8/4	0.01												<0.01	<0.01	<0.01
9/21					0.01								0.01	0.01	0.01
9/28						0.01					0.01		0.01	0.01	0.01
9/29									<0.01				<0.01	<0.01	<0.01
10/2					<0.01						<0.01		<0.01	<0.01	<0.01
10/3								<0.01					<0.01	<0.01	<0.01
10/10								<0.01					<0.01	<0.01	<0.01
10/26			0.01										<0.01	<0.01	<0.01

2008 Severe Ozone Nonattainment Areas

For Colorado and Texas, collective modeled contributions from selected coal-fired EGUs within the state, as well as modeled contributions from select individual facility and units that under-utilize or lack SCR controls, were evaluated. Impacts were analyzed on days when the observed MDA8 ozone concentration exceeded the 2015 ozone NAAQS of 75 ppb at AQS monitors located within a severe nonattainment area in each state of interest. Modeled impacts were also estimated at EJ zip codes in nonattainment areas on monitor exceedance days.

Relative source contributions at monitoring locations are also presented, with contributions that equal or exceed 1% of the NAAQS (0.75 ppb) highlighted in red and contributions that equal or exceed 0.5% of the NAAQS (≈0.37 ppb) highlighted in yellow. Relative source contributions from the model are calculated on an 8-hr average basis by multiplying the absolute modeled source contribution by the ratio of the monitored concentration and the total modeled ozone concentration. The resulting value gives a relative modeled contribution during a monitor exceedance day.

Modeled contributions at EJ zip codes in nonattainment areas are presented as absolute modeled concentrations since there are no ozone monitors at the EJ zip code locations. In **Appendix B**, tabular data for each state show monitoring MDA8 values compared with total modeled values on days when monitors exceeded the NAAQS.

Colorado

Impacts from selected coal-fired EGUs in Colorado (with/without SCR controls) were evaluated at AQS monitors and at EJ zip codes located within the Denver-Boulder-Greely-Ft. Collins-Loveland 2008 severe ozone nonattainment area on days where the monitored MDA8 ozone concentrations exceeded the 75 ppb NAAQS.

Monitoring days in 2016 that exceeded 75 ppb in Colorado nonattainment areas were compared with total modeled values from all sources and are presented in **Table B-8** in **Appendix B**. Modeled contributions from the coal-fired facilities in Colorado on those days are shown in **Table 20**.

Table 20. Modeled impacts from selected coal-fired EGUs[1] in Colorado (with/without SCR) at AQS monitors and EJ zip codes in severe ozone nonattainment areas on days in 2016 that exceeded the 2008 ozone NAAQS of 75 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.75 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.37 ppb) are highlighted in yellow.

Date	Aspen Park	Chatfield State Park	HIGHLAND RESERVOIR	NATIONAL RENEWABLE ENERGY LABS - NREL	ROCKY FLATS-N	WELCH	Zip 80216	Zip 80223
6/16	0.14			0.24	0.24		0.21	0.09
6/18					0.94		0.62	0.48
6/19				0.55			0.57	0.50
6/27		1.39		1.39	1.27	1.39	1.17	1.17
6/28					0.84		0.70	0.68
7/7				0.36			0.39	0.30
7/14		0.29		0.30			0.23	0.22
7/16		0.43		0.52			0.55	0.53
7/25				1.10	1.07	1.01	0.90	0.90
7/27		0.94	0.88	1.03	0.96	0.93	0.83	0.80
7/29				1.08			0.71	0.67
7/30		1.00					0.75	0.76
8/3		1.65		1.50			1.21	1.23

[1] Selected coal-fired EGUs in Colorado include: Cherokee, Comanche, Craig (Yampa), Rawhide, and Ray D Nixon

Texas

Impacts from all selected coal-fired EGUs in Texas (with/without SCR controls) were evaluated at AQS monitors and at EJ zip codes located within 2008 severe ozone nonattainment areas (Dallas-Fort Worth and Houston-Galveston-Brazoria) on days where monitoring concentrations exceeded the 75 ppb NAAQS. Impacts were also assessed for several facilities that had units that lacked or under-utilized SCR controls.

Monitoring days in 2016 that exceeded 75 ppb in Texas nonattainment areas were compared with total modeled values from all sources and are presented in **Appendix B** for the Dallas-Fort Worth (**Table B-9**) and Houston-Galveston-Brazoria (**Table B-10**) nonattainment areas. Modeled contributions from all selected coal-fired facilities in Texas on those days in each nonattainment area are shown in **Tables 21 and 22**. **Table 23** shows individual Texas facilities that have modeled contributions ≥ 0.5% of the NAAQS (0.37 ppb) on monitored 2008 NAAQS exceedance day/s. **Figure 3** shows locations of facilities listed in **Table 23**, AQS ozone monitoring stations, and EJ zip codes located in 2015 ozone moderate nonattainment areas. **Tables 24 through 29** present modeled contributions from the individual facilities in nonattainment areas where the facility had modeled contributions ≥ 0.5% of the NAAQS (0.37 ppb).

Table 21. Modeled impacts from all selected coal-fired EGUs[1] in Texas (with/without SCR) at AQS monitors and EJ zip codes in the Dallas-Fort Worth ozone nonattainment area, on days in 2016 that exceeded the 2008 ozone NAAQS of 75 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.75 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.37 ppb) are highlighted in yellow.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/6		0.01										0.01	0.01
6/7	0.04	0.08	0.03	0.04		0.02		0.01	0.01	0.01		0.03	0.03
6/8					2.02						1.83	1.56	1.59
6/20								1.08				0.89	0.90
6/30					0.63		0.39	0.40			0.61	0.28	0.29
7/1					0.87		0.72					0.64	0.71

8/31		0.38										0.27	0.33
9/21					0.67							0.38	0.32

[1] Selected coal-fired EGUs in Texas include: Coleto Creek, Fayette, JK Spruce, Limestone, Martin Lake, San Miguel, Tolk, Twin Oaks, WA Parish, and Welsh

Table 22. Modeled impacts from all selected coal-fired EGUs[1] in Texas (with/without SCR) at AQS monitors and EJ zip codes in the Houston-Galveston-Brazoria ozone nonattainment area, on days in 2016 that exceeded the 2008 ozone NAAQS of 75 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.75 ppb) are highlighted in red, , while values that equal or exceed 0.5% of the NAAQS (0.37 ppb) are highlighted in yellow.

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Westhollow	Lang	Northwest Harris County	Zip 77469	Zip 77471	Zip 77479
4/15				0.27	0.26			0.78	0.55	0.35
4/23		0.06		0.29	0.54	0.13	0.35	1.58	1.56	1.20
5/4		0.66						0.37	0.37	0.26
5/6				0.94	1.04	0.67		2.04	1.77	1.47
5/7	0.25							0.50	0.51	0.67
5/13				0.65				1.42	1.31	0.86
6/8					0.30			2.79	1.51	0.85
7/21							0.74	1.17	1.68	0.94
7/22			0.32					1.42	1.20	1.32
8/3			0.23					0.87	0.68	0.67
10/3					0.07			0.67	0.37	0.23
10/10					0.07			1.43	1.09	0.52

[1] Selected coal-fired EGUs in Texas include: Coleto Creek, Fayette, JK Spruce, Limestone, Martin Lake, San Miguel, Tolk, Twin Oaks, WA Parish, and Welsh

Table 23. Individual Texas facilities and units that have modeled contributions ≥ 0.5% of the NAAQS (0.37 ppb) on monitored 2008 NAAQS exceedance days

Facility	Modeled Units
WA Parish, TX	5, 6, 7, and 8 combined ('with SCR')
Fayette Power Project, TX	1, 2, and 3 combined ('No SCR')
Limestone, TX	1, and 2 combined ('No SCR')
Martin Lake, TX	1, 2, and 3 combined ('No SCR')
Welsh, TX	1 and 3 combined ('No SCR')

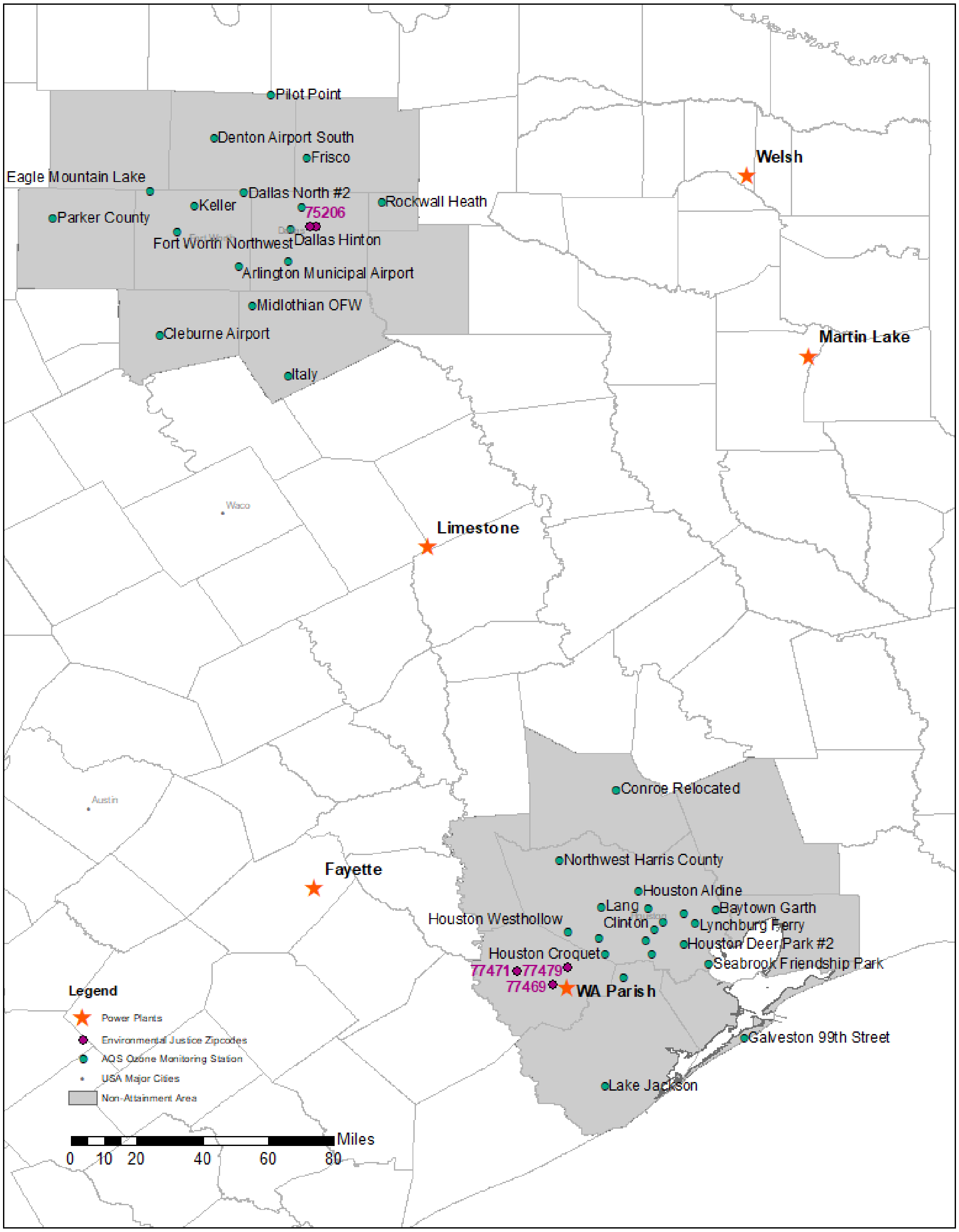

Figure 4. Facility locations with AQS ozone monitoring stations that exceeded the NAAQS and EJ zip codes located in 2008 ozone severe nonattainment areas.

Table 24. Modeled impacts from WA Parish facility (Units 5, 6, 7, 8 combined, with SCR) at AQS monitors and EJ zip codes in the Houston-Galveston-Brazoria ozone nonattainment area on days in 2016 that exceeded the 2008 ozone NAAQS of 75 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.75 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.37 ppb) are highlighted in yellow.

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Westhollow	Lang	Northwest Harris County	Zip 77469	Zip 77471	Zip 77479
4/15				0.07	0.07			0.61	0.36	0.20
4/23		<0.01		0.20	0.46	0.05	0.27	1.49	1.48	1.12
5/4		0.11						0.02	<0.01	0.01
5/6				0.12	0.32	0.02		1.33	1.11	0.78
5/7	0.06							0.26	0.25	0.48
5/13				0.26				1.30	1.15	0.65
6/8					0.13			2.70	1.35	0.75
7/21							0.71	1.17	1.68	0.94
7/22			0.31					1.42	1.19	1.32
8/3			0.21					0.86	0.68	0.67
10/3					0.05			0.65	0.36	0.22
10/10					0.06			1.43	1.09	0.52

Table 25. Modeled impacts from **Fayette** facility (Units 1, 2, 3 combined, without SCR) at AQS monitors and EJ zip codes in the Dallas-Fort Worth ozone nonattainment area on days in 2016 that exceeded the 2008 ozone NAAQS of 75 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values do not equal or exceed 1% of the NAAQS (0.75 ppb). Values that equal or exceed 0.5% of the NAAQS (0.37 ppb) are highlighted in yellow.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/6		<0.01										<0.01	<0.01
6/7	<0.01	<0.01	<0.01	<0.01		<0.01		<0.01	<0.01	<0.01		<0.01	<0.01
6/8					<0.01						<0.01	<0.01	<0.01
6/20								0.48				0.40	0.40
6/30					0.01		0.01	0.01			0.01	0.01	0.01
7/1					0.23		0.13					0.16	0.16
8/31		<0.01										<0.01	<0.01
9/21					0.01							0.01	0.01

Table 26. Modeled impacts from **Limestone** facility (Units 1 and 2 without SCR) at AQS monitors and EJ zip codes in the Dallas-Fort Worth ozone nonattainment area on days in 2016 that exceeded the 2008 ozone NAAQS of 75 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values that equal or exceed 1% of the NAAQS (0.75 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.37 ppb) are highlighted in yellow.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/6		<0.01										<0.01	<0.01
6/7	<0.01	<0.01	<0.01	<0.01		<0.01		<0.01	<0.01	<0.01		<0.01	<0.01
6/8					0.86						0.63	0.48	0.39
6/20								0.11				0.04	0.04
6/30					0.39		0.05	0.22			0.12	0.07	0.04
7/1					0.37		0.35					0.14	0.20
8/31		<0.01										<0.01	<0.01
9/21					0.23							0.13	0.07

Table 27. Modeled impacts from Martin Lake facility (Units 1, 2, and 3 combined without SCR) at AQS monitors and EJ zip codes in the Dallas-Fort Worth ozone nonattainment area on days in 2016 that exceeded the 2008 ozone NAAQS of 75 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. . Values that equal or exceed 1% of the NAAQS (0.75 ppb) are highlighted in red, while values that equal or exceed 0.5% of the NAAQS (0.37 ppb) are highlighted in yellow.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/6		<0.01										<0.01	<0.01
6/7	<0.01	<0.01	<0.01	<0.01		<0.01		<0.01	<0.01	<0.01		<0.01	<0.01
6/8					0.54						0.60	0.71	0.85
6/20								0.06				0.04	0.04
6/30					0.20		0.30	0.15			0.42	0.17	0.22
7/1					0.05		0.06					0.05	0.05
8/31		0.02										<0.01	<0.01
9/21					0.36							0.21	0.22

Table 28. Modeled impacts from Welsh facility (Units 1 and 3 without SCR) at AQS monitors and EJ zip codes in the Dallas-Fort Worth ozone nonattainment area on days in 2016 that exceeded the 2008 ozone NAAQS of 75 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values do not equal or exceed 1% of the NAAQS (0.75 ppb). Values that equal or exceed 0.5% of the NAAQS (0.37 ppb) are highlighted in yellow.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point	Zip 75206	Zip 75214
6/6		0.01										0.01	0.01
6/7	0.03	0.06	0.03	0.04		0.02		0.01	0.01	0.01		0.03	0.03
6/8					0.38						0.42	0.35	0.34
6/20								0.02				0.01	0.01
6/30					0.02		0.01	0.02			0.02	0.01	0.01
7/1					0.01		0.01					0.01	0.01
8/31		0.30										0.26	0.31
9/21					0.02							0.01	0.01

Table 29. Modeled impacts from **Welsh** facility (Units 1 and 3 without SCR) at AQS monitors and EJ zip codes in the Houston-Galveston-Brazoria ozone nonattainment area on days in 2016 that exceeded the 2008 ozone NAAQS of 75 ppb. 8-hr maximum modeled ozone contributions are relative values (ppb) at AQS monitors and absolute values (ppb) at EJ zip codes. Values do not equal or exceed 1% of the NAAQS (0.75 ppb). Values that equal or exceed 0.5% of the NAAQS (0.37 ppb) are highlighted in yellow.

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Westhollow	Lang	Northwest Harris County	Zip 77469	Zip 77471	Zip 77479
4/15				0.01	0.01			0.01	0.01	0.01
4/23		0.03		0.07	0.06	0.06	0.05	0.04	0.04	0.05
5/4		0.32						0.01	0.01	0.01
5/6				0.58	0.54	0.48		0.49	0.45	0.48
5/7	0.08							0.07	0.07	0.06
5/13				0.08				0.02	0.03	0.05
6/8					0.03			0.02	0.03	0.02
7/21							<0.01	<0.01	<0.01	<0.01
7/22			<0.01					<0.01	<0.01	<0.01
8/3			<0.01					<0.01	<0.01	<0.01
10/3					<0.01			<0.01	<0.01	<0.01
10/10					<0.01			<0.01	<0.01	<0.01

Appendix A. Modeling Methods

Photochemical Grid Model and Source Apportionment

To quantify the ozone impacts due to precursor emissions from individual EGUs and other emission source groups, Sonoma Technology performed CAMx OSAT source apportionment model simulations for the 2016 ozone season (April to October). The modeling domain covers all lower 48 U.S. states, plus adjacent portions of Canada and Mexico, using a horizontal grid resolution of 12 km x 12 km. The domain and configurations used were based on those developed by EPA in recent ozone transport assessments using CAMx OSAT (U.S. Environmental Protection Agency, 2022a), and included the use of the carbon-bond 6 gas phase chemistry mechanism and the two-mode course/fine (CF) aerosol chemistry mechanism.

The Comprehensive Air Quality Model with Extensions (CAMx version 7.10) (Ramboll US Corporation, 2020) is a publicly available, peer-reviewed, state-of-the-science three-dimensional grid-based (Eulerian) photochemical air quality model designed to simulate the emission, transport, diffusion, chemical transformation, and removal of gaseous and particle pollutants in the atmosphere over spatial scales ranging from continental to urban. CAMx was designed to approach air quality wholistically by including capabilities for modeling multiple air quality issues, including tropospheric ozone, fine particles, visibility degradation, acid deposition, air toxics, and mercury. The ability of photochemical grid models, such as CAMx, to treat a large number of sources and their chemical interactions makes them well suited for assessing the impacts of natural and anthropogenic emissions sources on air quality. CAMx is widely used to support regulatory air quality assessments and air quality management policy decisions in the United States. In recent years, the EPA has used CAMx to support the NAAQS designation process (U.S. Environmental Protection Agency, 2015) and evaluate interstate pollutant transport (U.S. Environmental Protection Agency 2015a, 2021a, 2022a).

CAMx also includes OSAT, which can be used to estimate the contributions of individual sources, groups of sources, or source regions to ozone concentrations at a given receptor location (Yarwood et al., 1996). Source apportionment modeling is useful for understanding model performance, designing emission control strategies, and performing culpability assessments to identify emission sources that contribute significantly to pollution. The key precursor species for ozone production are volatile organic compounds (VOC) and oxides of nitrogen (NO_x). OSAT uses reactive tracers to track the fate of these precursor emissions and the ozone formation resulting from them within a CAMx simulation. The ozone and precursors are tracked and apportioned by OSAT without perturbing the host model chemistry; therefore, the OSAT results are fully consistent with the host model results for total concentrations. OSAT can efficiently estimate source contributions from multiple emission sources within a single model simulation. Importantly, while source apportionment modeling can be used to estimate source contributions to ozone concentrations for a given set of emission inputs, sensitivity modeling approaches such as brute-force modeling[3] or the direct decoupled method (DDM)[4] are needed to quantify the effect of a given emission control scenario (e.g., 90% NO_x reduction at power plants) on ozone concentrations.

2016 EPA Model Platform

The CAMx OSAT simulations were based on EPA's 2016 air quality modeling platform. A modeling platform consists of a structured system of connected data and models that provide a consistent and transparent basis for assessing the air quality impact of anticipated changes in emissions. EPA develops and evaluates a new modeling platform each time the National Emissions Inventory (NEI) is updated (every three years). EPA has recently used the 2016 modeling platform to support the proposed Federal Implementation Plan ("Transport Rule") to help states fully resolve their obligations under the "Good Neighbor" provision of the Clean Air Act for the 2015 ozone NAAQS (U.S. Environmental Protection Agency, 2022a).

The CAMx OSAT simulations relied on EPA's 2016v2 (2016fj_16j) modeling platform. This platform draws on emissions data from the 2017 NEI (released spring of 2020) and data developed by the National Emissions Inventory Collaborative.[5] The NEI is compiled by EPA on a triennial basis, primarily from data submitted by state, local, and tribal air agencies. The 2017 NEI includes emissions from five source sectors: point sources, nonpoint (or area) sources, onroad mobile sources, nonroad mobile sources, and fire events. These NEI source sectors are divided into 20 sectors for the modeling platform. For the 2016v2 modeling platform, EPA updated the 2017 NEI data to represent year 2016 through the incorporation of 2016-specific state and local data along with adjustment methods appropriate for each emission sector.

For air quality modeling purposes, the 2016 NEI data was augmented by EPA to include biogenic emissions and data from Canadian and Mexican emissions inventories. In addition, the annualized point source data for EGUs in the NEI were replaced with hourly 2016 continuous emissions monitoring (CEMS) data from EPA's Clean Air Markets Division for SO_2 and NO_x. Annual emissions for pollutants were converted to an hourly basis using CEMS input data (U.S. Environmental Protection Agency, 2022c). The EGUs in the modeling platform are matched to units found in the National Electric Energy Data System (NEEDS) v6.20 database.[6] Onroad and nonroad mobile source emissions were developed using the version 3 of the Motor Vehicle Emissions Simulator (MOVES3) using activity data provided by state and local agencies.

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[3] The brute-force modeling method involves running the model both with and without emission controls applied to the source(s) of interest. The difference in pollutant concentrations between the two simulations yields the impact of the emission control scenario.
[4] DDM provides sensitivity coefficients that relate emissions changes to model outcomes. These sensitivity coefficients can be used to evaluate how pollutant concentrations would respond to a range of changes in emissions from a source or group of sources.
[5] The National Emissions Inventory Collaborative is a partnership between state emissions inventory staff, multi-jurisdictional organizations, federal land managers, EPA, and others to develop a North American air pollution emissions modeling platform for use in air quality planning.
[6] https://www.epa.gov/airmarkets/national-electric-energy-data-system-needs-v6 dated 5/28/2021

Source Apportionment Tagging

Sonoma Technology worked with the Sierra Club to identify sources and source groups to be tagged for ozone attribution analysis. In total, approximately 500 emission source tags were identified and modeled across multiple simulations. The tagged sources fell into one of the following categories:

- **EGU point sources (~250 tags)**: Coal and natural gas power plants, and in some cases individual units within a facility. Units may be tagged individually, by control equipment, by retirement date, and/or grouped by region.
- **Non-EGU point sources (~150 tags)**: Industrial point sources, tagged individually and/or grouped by state.
- **Transportation**: Onroad mobile sources separated by light- and heavy-duty vehicle emissions, grouped by region.
- **Building Combustion**: Commercial, institutional, and residential fossil fuel building combustion from the NEI nonpoint sector, grouped by state or ozone nonattainment area. This excludes residential wood combustion.

Meteorology

Meteorological inputs for the CAMx-OSAT simulations were developed by EPA for the 2016 modeling platform using version 3.8 of the Weather Research and Forecasting (WRF) numerical weather prediction model (Skamarock et al., 2008).The meteorological outputs from WRF include hourly varying winds, temperature, moisture, vertical diffusion rates, clouds, and rainfall rates. Selected physics options used in the WRF simulations include the Pleim-Xiu land surface model, Asymmetric Convective Model version 2 planetary boundary layer scheme, Kain-Fritsch cumulus parameterization, Morrison double moment microphysics, and RRTMG longwave and shortwave radiation schemes. Additional details about this WRF simulation and its performance evaluation can be found in U.S. Environmental Protection Agency (2021b).

Initial and Boundary Conditions

Initial and lateral boundary conditions for the 2016v2 modeling platform were developed from three-dimensional global atmospheric chemistry simulations with the Hemispheric version of the Community Multi-scale Air Quality Model (H-CMAQ) version 3.1.1 (Mathur et al., 2017). EPA used an H-CMAQ simulation for 2016 develop boundary conditions for a CAMx simulation at a horizontal grid resolution of 36 km x 36 km. The outputs from this simulation were used to provide initial and boundary conditions for the 12 km model simulation. OSAT tracks ozone transported through the boundaries, as well as ozone formation resulting from precursor emissions transported through the boundaries.

Post-Processing

The raw result from a CAMx OSAT simulation is hourly ozone contributions from each source tag at each grid cell in the modeling domain for the 2016 ozone season. These hourly contributions were extracted and post-processed for several hundred receptor sites, including ozone monitoring sites as well as locations identified by Sierra Club as environmental justice receptors within ozone nonattainment areas. At each receptor and for each day, the 8-hr average ozone contribution was calculated for each source tag using the averaging period corresponding to the period of highest modeled 8-hr average concentration at the receptor location. Although this analysis approach may not capture the largest ozone contributions modeled during the day, it does reflect contributions during time periods when modeled ozone concentrations are highest. This analysis approach also ensures that ozone contributions from all source tags[7] sum to total modeled 8-hr ozone concentration each day. The post-processed OSAT results along with relevant metadata were compiled into a web-based shinyapps.io dashboard application to facilitate future data mining and analysis.

OSAT outputs can also be used in a "relative sense" (rather than a "absolute sense") to apportion an ozone observation (e.g., a design value) into contributions from individual tags. One advantage to such an approach is that the contribution can be tied to an observed ozone concentration, rather than tied strictly to a modeled ozone concentration that may be biased. Ozone contributions were calculated using OSAT results in a "relative sense". Relative contribution fractions for each tag on a daily basis were calculated by multiplying the absolute modeled source contribution by the ratio of the monitored concentration and the total modeled ozone value.

Model Performance Evaluation

EPA evaluated its 2016 modeling platform using statistical assessments of modeled ozone predictions versus observations paired in time and space. Overall, EPA found that "the ozone model performance results for the CAMx 2016fj (2016v2) simulation are within or close to the ranges found in other recent peer-reviewed applications (e.g., Simon et al., 2012 and Emery et al., 2017)" and that "the model performance results demonstrate the scientific credibility" of the 2016v2 modeling platform." Additional details on the ozone model performance evaluation for EPA's 2016v2 platform can be found in the Technical Support Document (TSD) for the modeling platform (U.S. Environmental Protection Agency, 2022b).

[7] Including a leftover residual contribution from all untagged sources calculated by CAMx.

Appendix B. Monitoring Value and Modeling Value Tables on NAAQS Exceedance Days

The following tables present monitoring maximum daily average 8-hr (MDA8) values compared with total modeled MDA8 values on days when monitors exceeded the NAAQS.

Table B-1. Colorado monitoring days in 2016 exceeding the 2015 ozone NAAQS of 70 ppb at AQS monitors in nonattainment areas. Total modeled values in paratheses.

Daily monitored (modeled) MDA8 ozone concentration in ppb.

Date	Aspen Park	Chatfield State Park	DENVER - CAMP	HIGHLAND RESERVOIR	La Casa	NATIONAL RENEWABLE ENERGY LABS -	ROCKY FLATS-N	Welby	WELCH
6/16	81 (66)	75 (64)	74 (69)	72 (63)	73 (69)	86 (73)	82 (72)	72 (69)	74 (70)
6/17		74 (69)				72 (66)			71 (68)
6/18							79 (69)		
6/19						76 (78)			
6/26						75 (71)	71 (68)		
6/27	75 (67)	76 (65)	71 (67)	71 (62)	71 (67)	83 (73)	78 (70)		82 (73)
6/28						74 (66)	76 (68)		
7/7		71 (67)				80 (64)	72 (64)		74 (65)
7/12						73 (62)	73 (61)		
7/14	72 (70)	81 (66)		73 (62)		79 (59)			75 (64)
7/16		78 (69)		73 (71)		79 (73)	71 (70)		73 (73)
7/17		71 (63)							
7/19		75 (54)							
7/22		72 (44)		71 (43)					
7/25		71 (67)				83 (67)	89 (66)		76 (70)
7/27		86 (70)	73 (59)	76 (68)	73 (59)	88 (64)	81 (61)		82 (67)
7/28		75 (65)							
7/29		75 (60)				77 (57)			73 (60)
7/30	73 (57)	76 (59)				73 (57)			73 (58)
8/2						72 (55)	74 (53)		
8/3	74 (74)	80 (73)				76 (69)	74 (65)		75 (74)
8/7						73 (57)			

Date	Aspen Park	Chatfield State Park	DENVER - CAMP	HIGHLAND RESERVOIR	La Casa	NATIONAL RENEWABL E ENERGY LABS -	ROCKY FLATS-N	Welby	WELCH
8/12		73 (73)				72 (73)			72 (76)
8/16							75 (67)		

Table B-2. Indiana monitoring days in 2016 exceeding the 2015 ozone NAAQS of 70 ppb at AQS monitors in nonattainment areas. Total modeled values in paratheses.

Daily monitored (modeled) MDA8 ozone concentration in ppb.

Date	Charlestown State Park	Gary-IITRI	HAMMOND CAAP	New Albany-Green Valley Elem. Sch.	Ogden Dunes-Water Treatment Plant	VALPARAISO
4/17		73 (56)			71 (57)	
4/18	73 (63)					71 (66)
4/19	72 (63)					
4/20	71 (60)			73 (61)		
5/24						72 (57)
6/9	77 (70)			71 (67)		
6/11	72 (69)	78 (61)		73 (69)	78 (62)	77 (58)
6/10	83 (69)			80 (64)		
6/13				71 (69)		
6/19						72 (55)
6/25				83 (77)		
7/21	72 (85)					
7/27			78 (66)			
8/3		71 (72)	76 (69)		72 (69)	
8/10			75 (64)			

Table B-3. Kentucky monitoring days in 2016 exceeding the 2015 ozone NAAQS of 70 ppb at AQS monitors in nonattainment areas. Total modeled values in paratheses.

Daily monitored (modeled) MDA8 ozone concentration in ppb.

Date	Bates	BUCKNER	CANNONS LANE	NORTHERN KENTUCKY UNIVERSITY (NKU)	SHEPHERDS-VILLE	Watson Lane
5/24		74 (63)	71 (59)	71 (65)		
6/3						72 (65)
6/10	71 (69)		80 (74)			
6/11	81 (72)	72 (71)	80 (71)	71 (70)		
6/13			76 (66)	75 (65)		73 (74)
6/25			72 (88)			
6/30	73 (65)		86 (74)			
7/19			71 (69)			
7/21			74 (80)			
7/23			71 (65)			
8/3			71 (66)			
9/14	74 (63)				77 (70)	77 (70)
9/23		73 (57)	72 (66)			
9/24	73 (67)		73 (64)			
9/25			73 (59)			

Table B-4. Missouri monitoring days in 2016 exceeding the 2015 ozone NAAQS of 70 ppb at AQS monitors in nonattainment areas. Total modeled values in paratheses.

Daily monitored (modeled) MDA8 ozone concentration in ppb.

Date	Arnold West	Blair Street	Farrar	Maryland Heights	Orchard Farm	Pacific	West Alton
5/23					75 (65)		75 (63)
6/8				78 (62)			
6/9							74 (71)
6/10			76 (62)				72 (70)
6/13							86 (67)
6/16				71 (62)			
6/18	73 (63)			77 (67)	76 (60)	77 (67)	74 (60)
6/27						73 (77)	
7/20				72 (55)			
7/23				73 (76)			
8/4					81 (78)		75 (76)
8/9	71 (51)	79 (48)		81 (43)			74 (57)
8/10					72 (70)		71 (59)
9/21					78 (62)		
9/22					71 (66)		78 (69)
9/23		74 (64)			78 (66)		78 (76)
9/24					72 (66)		71 (64)

Table B-5. Dallas-Fort Worth nonattainment area, Texas monitoring days in 2016 exceeding the 2015 ozone NAAQS of 70 ppb at AQS monitors in the nonattainment area. Total modeled values in paratheses.

Daily monitored (modeled) MDA8 ozone concentration in ppb.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Eagle Mountain Lake	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point
6/6		80 (60)										
6/7	95 (81)	85 (67)	82 (78)	81 (79)		72 (63)	95 (79)		83 (67)	85 (69)	88 (58)	
6/8					83 (67)							78 (68)
6/9					75 (62)							75 (66)
6/10					73 (63)							
6/20			71 (52)		72 (63)				77 (68)			
6/29										72 (70)		
6/30					76 (78)			76 (77)	76 (80)			83 (79)
7/1					79 (75)			76 (81)	71 (79)			75 (73)
7/26							73 (51)			72 (55)		
8/5								73 (58)				71 (55)
8/31		78 (68)										
9/11			73 (55)									
9/20									72 (51)			
9/21					81 (78)				75 (75)			
9/22					72 (73)							73 (74)
10/1								74 (62)				75 (58)
10/3		72 (55)			71 (60)							

Table B-6. Houston-Galveston-Brazoria ozone nonattainment area, Texas monitoring days in 201 exceeding the 2015 ozone NAAQS of 70 ppb at AQS monitors in the nonattainment area. Total modeled values in paratheses.

Daily monitored (modeled) MDA8 ozone concentration in ppb.

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Croquet	Houston Deer Park #2	Houston East	Houston Westhollow	Lake Jackson	Lang	Manvel Croix Park	Northwest Harris County
4/3			73 (52)									
4/5	75 (61)											
4/7		74 (53)										
4/14		71 (35)										
4/15				83 (54)				79 (56)				
4/23		84 (62)	74 (67)	78 (68)				79 (73)		80 (71)		78 (71)
4/27	75 (61)		75 (58)									
5/4		82 (58)										
5/6				84 (65)			71 (59)	84 (73)		78 (67)		
5/7	80 (68)	71 (51)	71 (58)									
5/13				78 (59)				73 (72)				
6/8		75 (67)			72 (76)			78 (75)				
7/21			72 (61)							74 (65)		79 (66)
7/22			83 (47)									
8/3			89 (58)									
8/4	71 (59)											
9/21					74 (64)							
9/28						72 (65)					75 (64)	
9/29									73 (69)			
10/2					73 (59)						73 (57)	
10/3								84 (70)				
10/10								80 (71)				
10/26			74 (56)									

Table B-7. San Antonio ozone nonattainment area, Texas monitoring days in 2016 exceeding the 2015 ozone NAAQS of 70 ppb at AQS monitors in the nonattainment area. Total modeled values in paratheses.

Daily monitored (modeled) MDA8 ozone concentration in ppb.

Date	Calaveras Lake	Camp Bullis	San Antonio Northwest
5/5			73 (56)
5/6			71 (59)
9/28	71 (59)		
10/2		74 (64)	76 (71)
10/11		81 (71)	72 (69)

Table B-8. Colorado monitoring days in 2016 exceeding the 2008 ozone NAAQS of 75 ppb at AQS monitors in severe ozone nonattainment areas. Total modeled values in paratheses.

Daily monitored (modeled) MDA8 ozone concentration in ppb.

Date	Aspen Park	Chatfield State Park	HIGHLAND RESERVOIR	NATIONAL RENEWABLE ENERGY LABS - NREL	ROCKY FLATS-N	WELCH
6/16	81 (66)			86 (73)	82 (72)	
6/18					79 (69)	
6/19				76 (78)		
6/26						
6/27		76 (65)		83 (73)	78 (70)	82 (73)
6/28					76 (68)	
7/7				80 (64)		
7/14		81 (66)		79 (59)		
7/16		78 (69)		79 (73)		
7/25				83 (67)	89 (66)	76 (70)
7/27		86 (70)	76 (68)	88 (64)	81 (61)	82 (67)
7/29				77 (57)		
7/30		76 (59)				
8/3		80 (73)		76 (69)		

Table B-9. Dallas-Fort Worth nonattainment area, Texas monitoring days in 2016 exceeding the 2008 ozone NAAQS of 75 ppb at AQS monitors in the nonattainment area. Total modeled values in paratheses.

Daily monitored (modeled) MDA8 ozone concentration in ppb.

Date	Arlington Municipal Airport	Cleburne Airport	Dallas Hinton	Dallas Redbird Airport Executive	Denton Airport South	Fort Worth Northwest	Frisco	Grapevine Fairway	Keller	Parker County	Pilot Point
6/6		80 (60)									
6/7	95 (81)	85 (67)	82 (78)	81 (79)		95 (79)		83 (67)	85 (69)	88 (58)	
6/8					83 (67)						78 (68)
6/20								77 (68)			
6/30					76 (78)		76 (77)	76 (80)			83 (79)
7/1					79 (75)		76 (81)				
8/31		78 (68)									
9/21					81 (78)						

Table B-10. Houston-Galveston-Brazoria ozone nonattainment area, Texas monitoring days in 2016 exceeding the 2008 ozone NAAQS of 75 ppb at AQS monitors in the nonattainment area. Total modeled values in paratheses.

Daily monitored (modeled) MDA8 ozone concentration in ppb.

Date	Conroe Relocated	Galveston 99th Street	Houston Aldine	Houston Bayland Park	Houston Westhollow	Lang	Northwest Harris County
4/15				83 (54)	79 (56)		
4/23		84 (62)		78 (68)	79 (73)	80 (71)	78 (71)
5/4		82 (58)					
5/6				84 (65)	84 (73)	78 (67)	
5/7	80 (68)						
5/13				78 (59)			
6/8					78 (75)		
7/21							79 (66)
7/22			83 (47)				
8/3			89 (58)				
10/3					84 (70)		
10/10					80 (71)		

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Analysis of NOx Emissions for Selected Coal-Fired Units

by

Dr. Ranajit (Ron) Sahu, Consultant[1]

I was asked to review the recent NOx performance of selected coal-fired Electricity Generating Units (EGUs) located in areas impacting 2015 ozone moderate non-attainment areas as well as the units that are impacting the 2008 ozone non-attainment areas.

Generally, the units at issue are either equipped with Selective Catalytic Reduction (SCR) and have relatively elevated NOx levels. Or, in other cases they do not have SCR installed and, as a result, have elevated NOx emissions levels.

In all cases, I assessed NOx emissions as a 30-day average, expressed in units of pounds per million Btu heat input (lb/MMBtu).

My analysis, while presented in this report by state, followed the same general approach for the two sets of units at issue – i.e., units with SCR and those without. I therefore address the overall methodology in this section and do not then repeat that in each subsequent state-by-state analysis.

A. Assessment of NOx Emissions for Units Equipped with SCR

Generally speaking units that have SCR installed should achieve low NOx levels, especially on a 30-day rolling average basis. While the SCR catalyst does require a minimum operating temperature (MOT) in order to provide requisite NOx reductions, and while this MOT may not be met until a certain minimum load (i.e., minimum heat input or electrical power output) for a unit, the lowest heat inputs or capacity factors at which SCR can be effective can be addressed using a number of operational strategies meaning that the NOx-reduction efficiency of SCRs can be maintained at a high level for the vast majority of the time. I have addressed these operational strategies in other prior reports and include excerpted discussions of them in Appendix A. Thus, unless a unit is operated as a cyclic unit with frequent low load operation (i.e., below its SCR's capability after employing operational strategies), the 30-day average NOx emissions levels should be low, if the SCR is properly operated.

In this analysis, rather than address theoretical SCR capability of a particular unit's SCR and its performance, which would require non-public information on the design of the SCR and its catalyst along with unit operating parameters, I instead focus on the actual demonstrated NOx emissions levels achieved by the unit as reported to EPA's Clean Air Markets (or Acid Rain) database. While

[1] Resume provided in Appendix B.

this data is reported on an hourly basis, and includes the unit's heat input, power output, and NOx emissions levels, I focused my analysis on the daily and monthly reported performance. Based on past experience in these types of analysis, I considered the reported monthly NOx performance for a substantial but recent time period. Typically I reviewed monthly data from October 2017 through September 2022. This 60-month period covering 5 ozone seasons (i.e., May through October periods in 2018, 2019, 2020, 2021, and 2022) provide a representative record of the units performance under a wide range of operating time periods including periods before, during, and after the COVID 19 pandemic.

Also based on past experience, since I analyzed monthly data for a 60-month time period, I did not also need to repeat the analysis for rolling 30-day average time periods because there is little difference between 30-day rolling averages and monthly averages as long as the latter are considered for a substantial (i.e., the 5 year or 60-month period in this analysis) period, for the purposes of this analysis.

Here, the purpose was to determine the recent performance of the unit and its SCR, as reflected in the reported NOx emission rate. Importantly, it is assumed that if a unit has reported actual, low levels of NOx in this recent time period (as opposed to, for example, more distant past time periods when the SCR at the unit may have been first installed), when otherwise operating normally or in a representative manner, it can achieve that or similarly low level of NOx at other times, such as by properly or more optimally operating its existing SCR. Thus, expectations of low NOx from proper SCR operation are judged not by some theoretical standard but by the unit's own, recent, reported NOx performance.

Based on this analysis, for each unit with existing SCR, I conclude that such units have demonstrated low NOx levels (generally NOx levels of 0.07 lb/MMBtu or lower) on a monthly (i.e., 30-day average) basis in recent time periods and can therefore reasonably be required to do so in the future. The coal fired EGUs with SCRs installed that I analyzed in this report have each demonstrated that they have recently achieved and maintained significantly lower NOx emissions rates than what they often operate at, and that they can therefore consistently achieve those lower NOx rates if required to do so. Low capacity factors and MOT are not the factors that are precluding the coal fired EGUs from operating at those demonstrated, lower NOx emission rates.

B. Assessment of NOx Emissions for Units Currently Operating without SCR

There is no question that SCR is a proven NOx-reducing technology for coal-fired units, regardless of the type of coal burned. In the US fleet today there are SCR's in use at bituminous, sub-bituminous, as well as lignite coal units. Thus, the technical feasibility of installing and operating SCRs at units that do not have them is not at issue.

B.1 Cost Effectiveness of SCR On Coal Fired EGUs Generally

The widespread installation of SCRs on coal fired EGUs in the United States is indicative of the fact that SCRs are a proven cost-effective means of NOx reduction at coal fired EGUs. Over 60 percent of existing coal fired EGUs in the US over 100 MWs have SCRs, and for over 20 years all new operating coal fired EGUs have included SCRs. There can be no doubt that as an industrial sector, SCRs are reasonable to install, cost effective NOx reduction technologies.

B.2 Cost-Effectiveness of SCR

I have also conducted a second, unit specific analysis of the cost per ton of NOx reduction at selected coal fired EGUs in the US. I then compared my unit specific calculations of the cost per ton of NOx reduction at those units with the cost per ton of NOx reductions that regulatory agencies have determined to be cost effective at other coal fired EGUs in the US. SCRs would be cost effective at those units. Following long-standing practice using EPA-approved approaches, cost-effectiveness was addressed by estimating the dollars per ton of NOx reduced using SCR. The cost or numerator of the cost-effectiveness metric represents the annualized cost of the capital and operating costs of the SCR while the denominator or tons reduced represents the efficacy of the SCR.

For this analysis, I used the SCR cost-effectiveness methodology used by EPA as reflected in the Sargent and Lundy report on SCR.[2] This analysis considers the capital as well as the operating costs for the SCR. In conducting the analysis, I used the so-called overnight cost methodology, not including carrying costs of capital during construction. In all other aspects, the analytical methodology is highly conservative, i.e., reflects a higher than expected cost of the SCR.

Specifically, I used the following:

(i) the EPA-assumed capital cost of over $300/kW for the SCR. This is conservative based on past actual incurred costs for SCRs in US coal units, which have typically ranged from $250/kW or lower;

(ii) the post-SCR NOx level of generally around 0.03 to 0.05 lb/MMBtu, reflecting an SCR NOx reduction of less than 90%. While SCR can achieve 90% or greater NOx reduction, the efficiency does depend on the baseline or pre-SCR NOx levels, with higher efficiencies possible when baseline NOx levels are higher. Thus, while assuming a 90% reduction with SCR is appropriate with the baseline NOx is, say, 0.3 lb/MMBtu, it would not be appropriate to assume that the same 90% reduction would be possible if the baseline NOx is lower, at, say, 0.1 lb/MMBtu. I therefore adjust or assume appropriate NOx reduction efficiencies with SCR depending on the baseline NOx level for a unit;

[2] https://www.epa.gov/sites/default/files/2018-05/documents/attachment_5-3_scr_cost_development_methodology.pdf

(iii) for the baseline NOx level, I used the median of the actual NOx levels reported in the past 5 years or so;

(iv) for the unit's operations, I used a capacity factor that was the higher of the 2017-2021 median capacity factor or its more recent January-September 2022 capacity factor. This is a reasonable assumption given how COVID affected the capacity factors purely on a historical look-back basis. In most instances, this capacity factor is conservative i.e., it could be higher in the future, which would make my estimated cost-effectiveness conservative as well, meaning that the SCR would be even more cost-effective than I estimate;

(v) for annualizing the capital cost, I used EPA's standard assumptions of a 7% annual interest rate and a 30-year life of the SCR. The latter is conservative since SCR units can last longer than 30 years. Of course, the catalyst replacement or refurbishment would occur more frequently, typically every 3-5 years, depending on the unit's capacity factor;

(vi) a multi-unit capital cost discount of 15% when a plant has more than one unit. This simply reflects the procurement benefit of contracting with vendors for multiple SCRs at the same plant. In reality, this is likely conservative, since multi-unit discounts could and should be higher if proper procurement strategies are used.

Using the inputs above I obtain and report the estimated SCR cost-effectiveness values. In order to determine whether the estimated values are cost-effective or not, I compare them with policy thresholds used by EPA and various states. I note that some states such as Connecticut have deemed SCR to be cost effective when the cost-effectiveness was greater than $ 13,635 /ton reduced, Regs. Conn. State Agencies § 22a-174-22e(h)(1)(A)(iii), and New Jersey found SCR on oil-fired boilers cost effective at up to $18,000 per ton. NJ DEP, State Implementation Plan Revision for Infrastructure and Transport Requirements for the 70 ppb and 75 ppb 8-hour Ozone NAAQS and Negative Declaration for the Oil and Natural Gas Control Technique Guidelines 15 (May 2019), https://dep.nj.gov/wp-content/uploads/airplanning/InfraTransportSIP2019-FinalSIP.pdf. EPA has previously found SCRs cost effective at $11,000 per ton. 87 Fed. Reg. 20,036, 20,081 (Apr. 6, 2022). Thus, based on my experience, EPA and states have deemed controls such as SCR to be cost-effective in the range of $10,000 to $15,000 per ton reduced. I note that many of these regulatory cost-effectiveness values have not been adjusted upward for inflation. Collectively, I reiterate that there is substantial conservatism built into the cost calculation that I have conducted.

B.2 Installation Schedule for SCR

In addition to cost-effectiveness, I was also asked to address the estimated time that will be needed to install SCR(s) at plants that do not have SCR at the present. EPA has previously concluded that an SCR can be installed at a coal fired EGU in as little as 21 months, while multiple SCRs at the same facility may take longer. Environmental Protection Agency, Final Report, Engineering and Economic Factors Affecting the Installation of Control Technologies for Multipollutant Strategies

(2002), EPA-600/R-02/073, available at https://archive.epa.gov/clearskies/web/pdf/multi102902.pdf ("It is expected that one SCR system requires about 21 months of total effort for planning, engineering, installation, and startup. Multiple SCR systems at one facility would take longer to install (e.g., approximately 35 months for seven SCRs."). Industry estimates are even shorter. Institute Of Clean Air Companies, Typical Installation Timelines for NOx Emissions Control Technologies On Industrial Sources (December 2006), available at https://cdn.ymaws.com/www.icac.com/resource/resmgr/ICAC_NOx_Control_Installatio.pdf (48-58 weeks from commercial RFQ date). Other state air agencies have similarly relied upon a 21-month installation timeline. See Maryland Department of the Environment TECHNICAL SUPPORT DOCUMENT FOR COMAR 26.11.38 - Control of NOx Emissions from Coal-Fired Electric Generating Units available at https://mde.maryland.gov/programs/Regulations/air/Documents/TSD_Phase1_with_Appendix.pdf. I note that there are no significant long-lead items that drive longer SCR installation schedules. Further, I note that "typical" SCR schedules reflecting historical installation timelines are generally based on a business-as-usual (BAU) approach, with little incentive for faster installation.

While an exact unit specific SCR installation timeline is necessarily a unit-specific determination, it is my opinion that SCRs at specific units or plants can, as a general matter, especially with incentivized contracting approaches, be achieve in a time range of 26-36 months. This is particularly true if those units have already started consideration of SCR installation, such as for compliance with other regulatory requirements such as Regional Haze or the Cross State Air Pollution Rule.

When estimating timelines for SCR installation in the present context – i.e., recognizing that substantial ozone reductions can be obtain via precursor NOx reductions at units without SCRs – it is fair, in my opinion, to assume the following:

(i) that the SCR installation project will prioritize time reduction in contracting and not simply follow typical or BAU approaches with regards to project planning, engineering, contracting, procurement, fabrication, installation, and commissioning, etc.;

(ii) that some degree of prior planning or prior assessment of SCR at each unit without SCR has likely occurred in the past or is in process. In other words, it is more likely than not that any US coal unit that is currently operating without SCR has likely considered and perhaps even planned for a SCR retrofit project even though such a project has not obviously yet been implemented. This is particularly likely given EPA's draft Cross State Air Pollution Rule, due to be finalized in March 2023, and other regulatory obligations such as EPA's Regional Haze obligations. Thus, an SCR installation project at any unit not currently using SCR cannot reasonably be a complete surprise and will not need to be started from scratch. This presumption will also reduce installation times to the lower end of the 26-36 month range.

I now show the results of my analysis on a state-by-state basis. I note that I was not asked to address every single coal-unit in each of the states below, but selected, example, units.

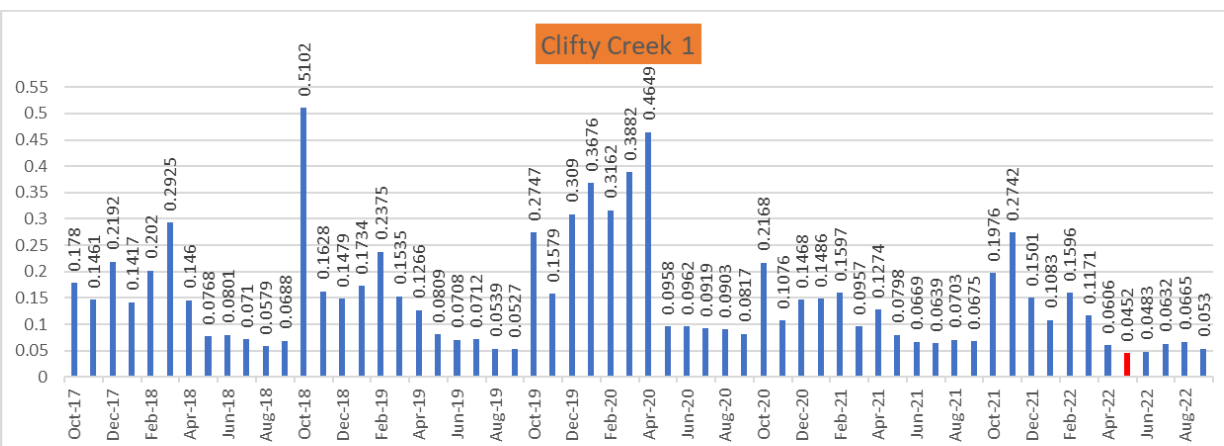
Indiana

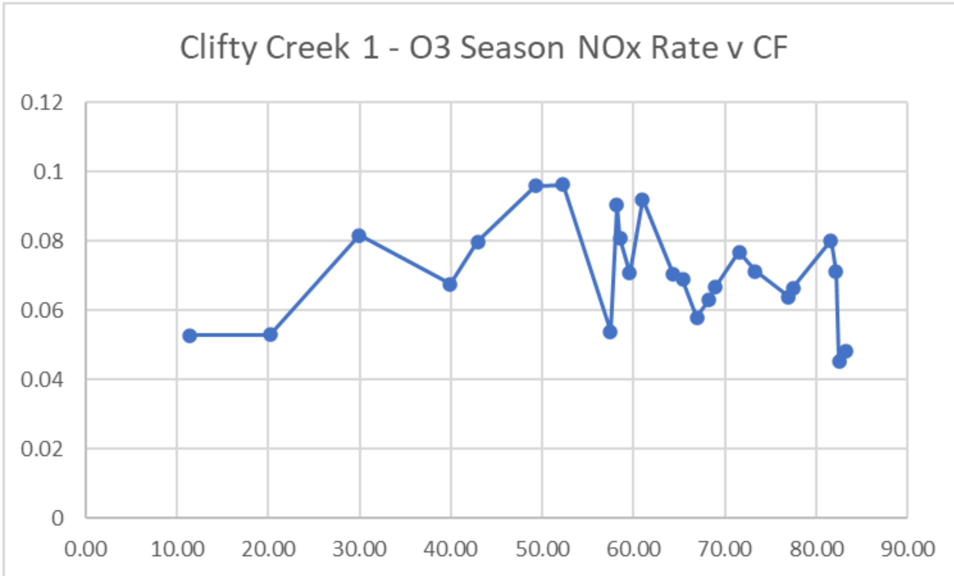
(A) Units with SCR

In Indiana, I address Clifty Creek Units 1 through 5. Each of these units is rated at around 217 MW and has an existing SCR. The table below summarizes the NOx performance in the last three columns, in units of lb/MMBtu. While the minimum NOx levels in the 60-month period analyzed were lower than 0.07 lb/MMBtu for each unit, the highest-month NOx as well as the highest-month NOx during the ozone seasons were substantially greater than 0.07 lb/MMBtu, especially for Units 4 and 5.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max O3 Months
Clifty Creek, IN	1	217.3	0.0452	0.5102	0.0962
	2	217.3	0.0461	0.4083	0.0962
	3	217.3	0.0457	0.4489	0.0962
	4	217.3	0.0605	0.3955	0.2473
	5	217.3	0.0646	0.3874	0.1954

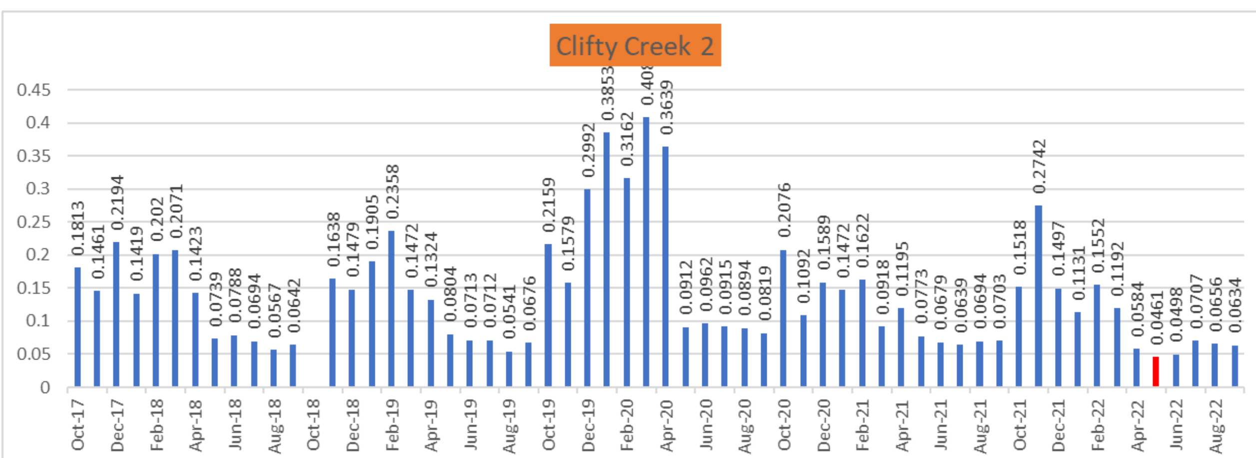
Below, I show, for each unit, two separate charts. The first chart shows the actual NOx by month, in lb/MMBtu. The lowest month is shown in red. In the chart that follows I show the actual monthly NOx levels (in lb/MMBtu on the vertical axis) during just the ozone season months, as a function of the monthly capacity factor (on the horizontal axis). As I noted earlier, SCR performance can potentially degrade at low capacity factors since a unit may spend operating times (within the 30-day average) below the MOT for the SCR, thus emitting NOx that is not reduced by the SCR.



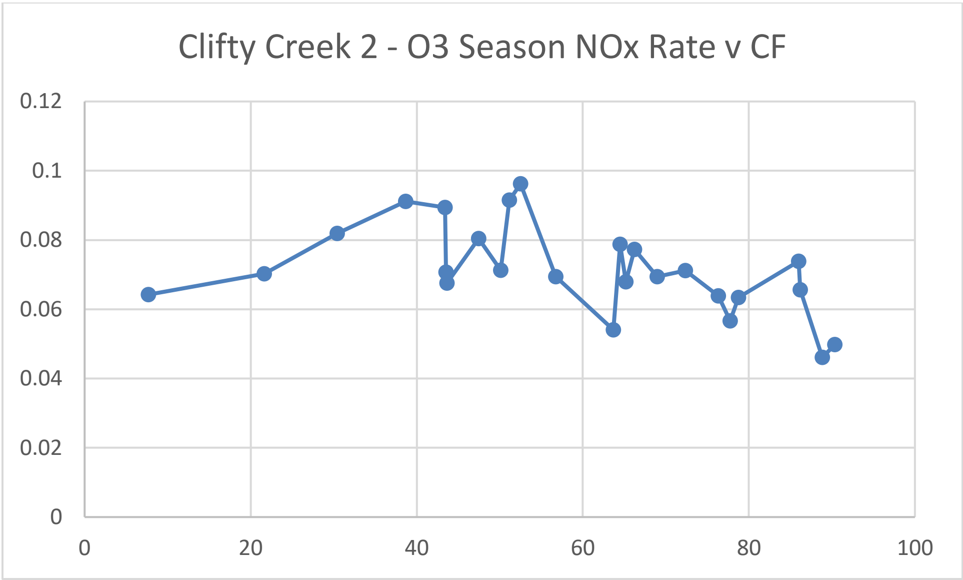


The chart above for Clifty Creek 1 shows that even at low monthly capacity factors (i.e., 10 and 20 percent), the NOx performance was below 0.07 lb/MMBtu. Collectively, the data above confirm that Clifty Creek 1's SCR can be operated such that it can meet a 30-day average NOx level of 0.07 lb/MMBtu.

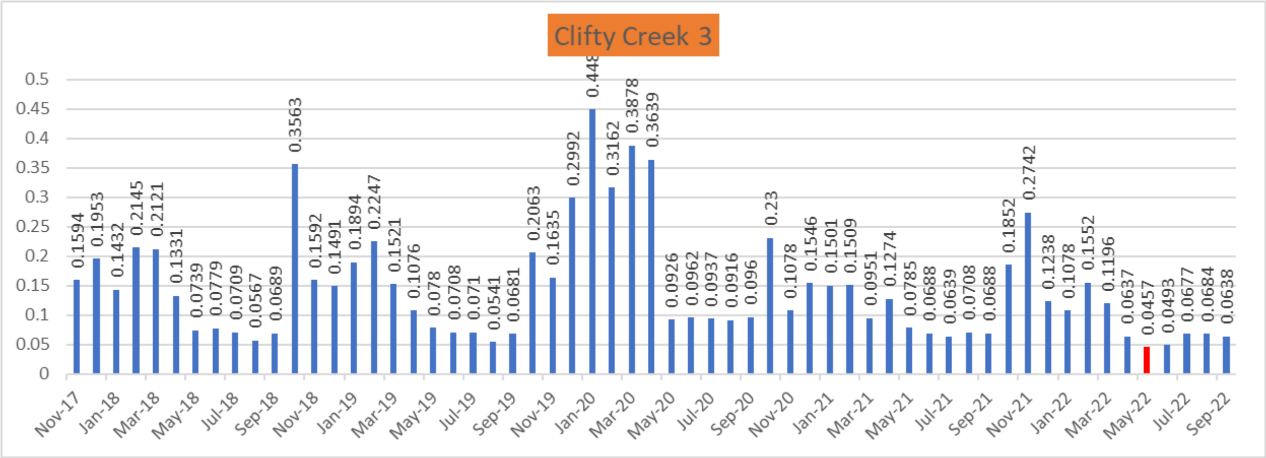
Next, I show similar charts below for Clifty Creek 2. Again, the lowest NOx month in the first chart (0.0461 lb/MMBtu) is shown in red.



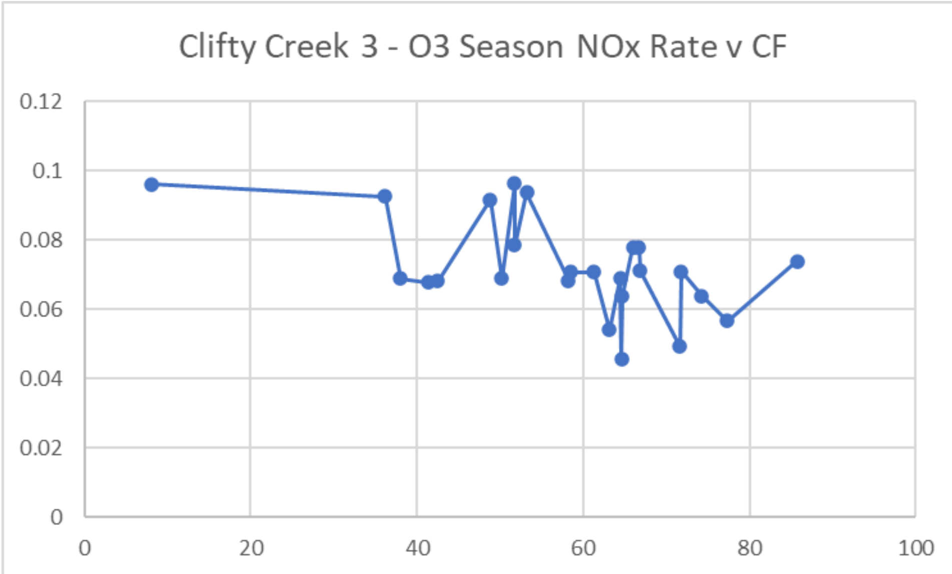
The ozone season monthly data as a function of capacity factor, shown below, also confirm that Clifty Creek 2 should be able to meet a 30-day average NOx level of 0.07 lb/MMBtu.



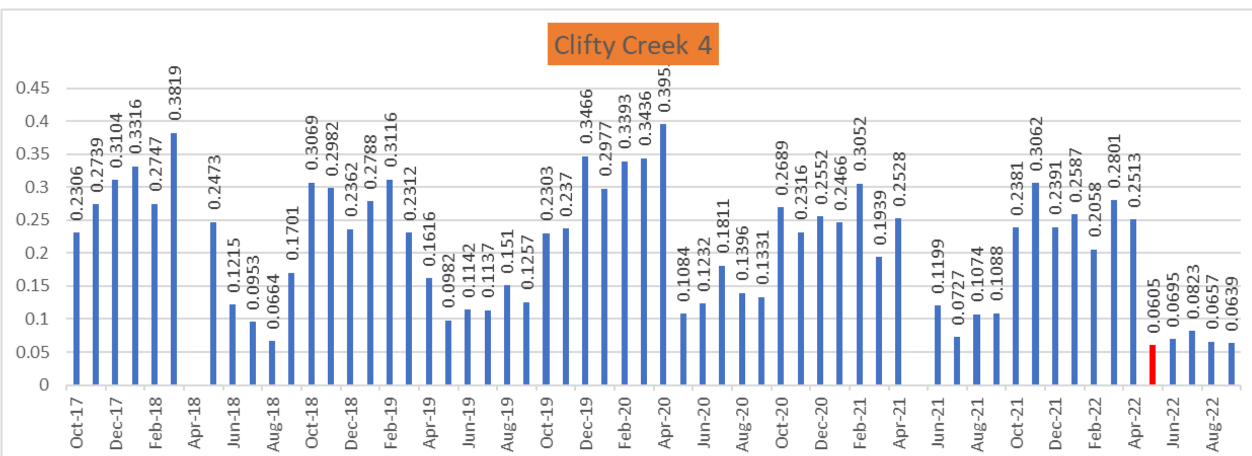
The performance charts for Clifty Creek 3, shown below, are similar to those for Clifty Creek 1 and 2 noted above.

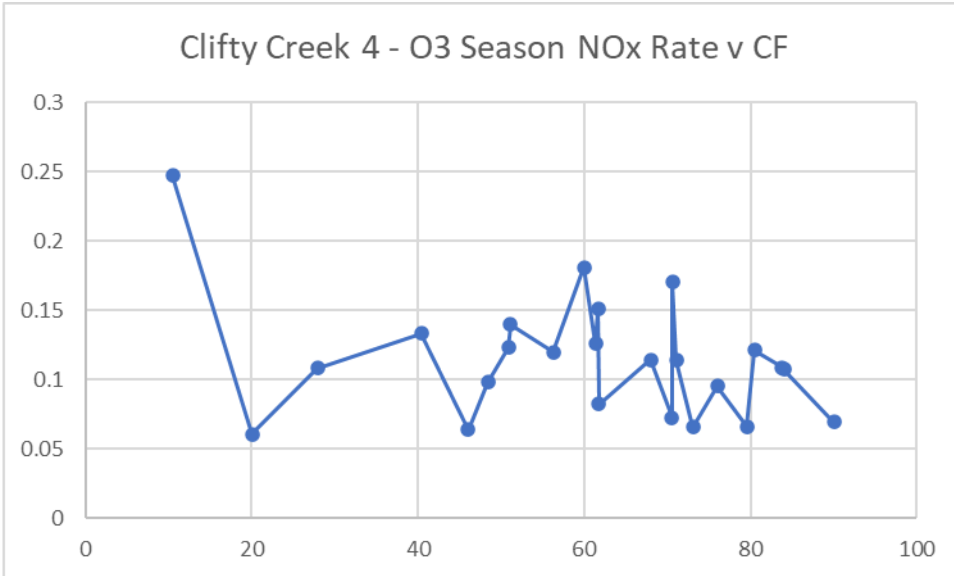


However, the NOx levels at the lowest capacity factors in the ozone season months, shown in the chart below, are not as low as for Clifty Creek Units 1 and 2. The reason for the higher NOx levels for the lowest capacity factors (as compared to Clifty Creek Units 1 and 2) was not readily ascertainable. Regardless, based on the overall NOx levels that the unit achieved, a 30-day average level of 0.07 lb/MMBtu should be achievable at this unit.

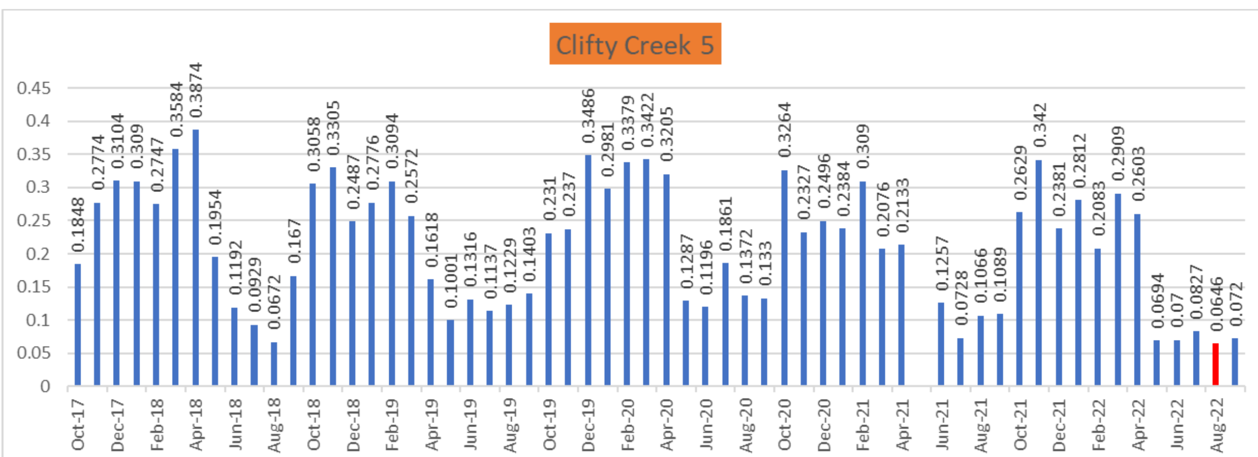


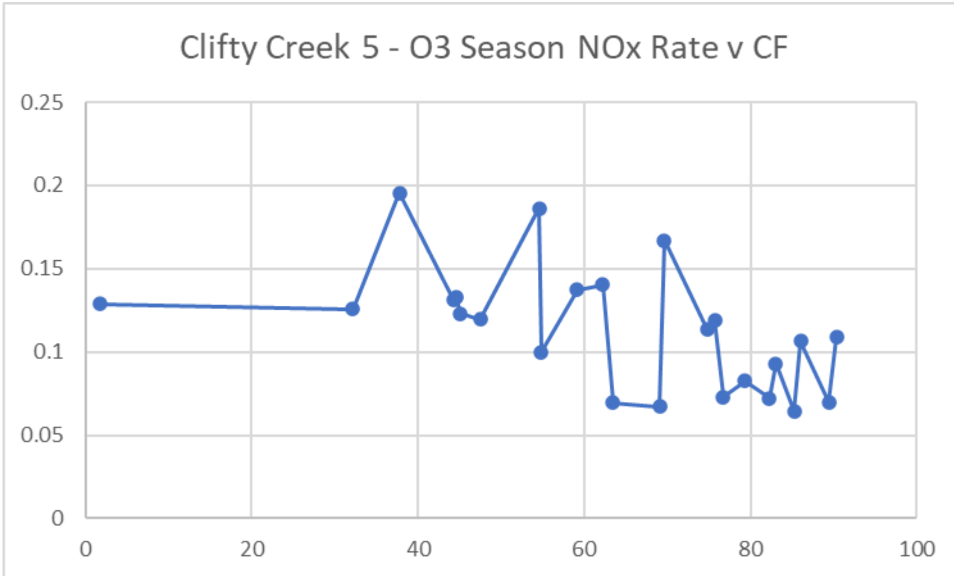
The monthly NOx and ozone season NOx as a function of capacity factor for Clifty Creek 4 are shown below. The NOx levels are higher than Units 1, 2, and 3. While there are several months, including the lowest month shown in red below, where the NOx level was below 0.07 lb/MMBtu, in general, the NOx performance for many months in the last 5 years was significantly greater than in the case of Units 1-3. Clearly, the SCR for this Unit 4 is not being operated optimally or as well as the SCRs for Units 1-3. However, the SCR's capability to reduce NOx is clearly shown by the low NOx levels achieved in several months throughout the 5-year period.





The NOx data for Clifty Creek Unit 5 are similar to that of Unit 4 above – i.e., not as good as the performance for Units 1-3.





Yet, given the performance of the SCRs at Units 1-3, it is my opinion that the SCR's for Unit 5 above (and Unit 4, prior) can be operated better and therefore realize lower levels of NOx similar to Units 1-3's demonstrated performance.

<u>(B) Units Without SCR</u>

The only Indiana unit without SCR that I analyzed was Unit 6 also at Clifty Creek. The summary of the cost-effectiveness for an SCR at this unit is shown in the table below. I have previously discussed the various inputs, and their general conservativeness earlier. The cost-effectiveness is estimated to be $9,609 per ton of NOx reduced. As such SCR is cost-effective for this unit based on previous cost effectiveness determinations by regulatory agencies at other units as discussed earlier.

SUMMARY OF SCR COST-EFFECTIVENESS

Plant	Unit	UnitSize [1]	MedianNOx [2]	SCREff	PostSCRNOx	CapFac [3]	SCR CE [4]	SCR CE w/Multi-unit Discount
Clifty Creek	6	217	0.263	80	0.053	36.4	$ 9,609	N/A

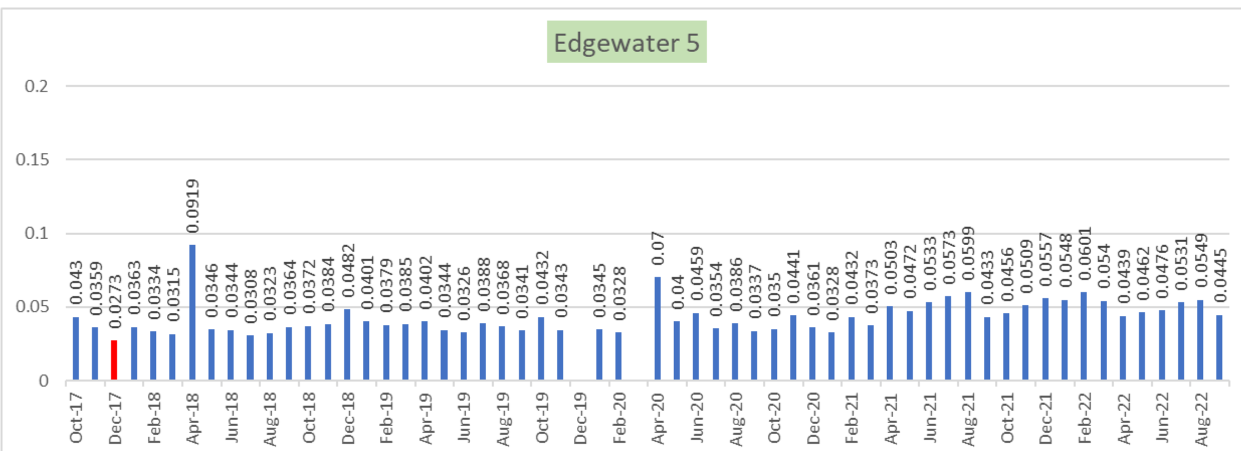
[1] UnitSize	MW
[2] MedianNOx	2018-Sep 2022 Monthly NOx (lb/MMBtu)
[3] CapFac	Maximum of: Median Monthly 2017-2021 or Jan-Oct 2022
[4] SCR CE	SCR Cost-Effectiveness, $/ton

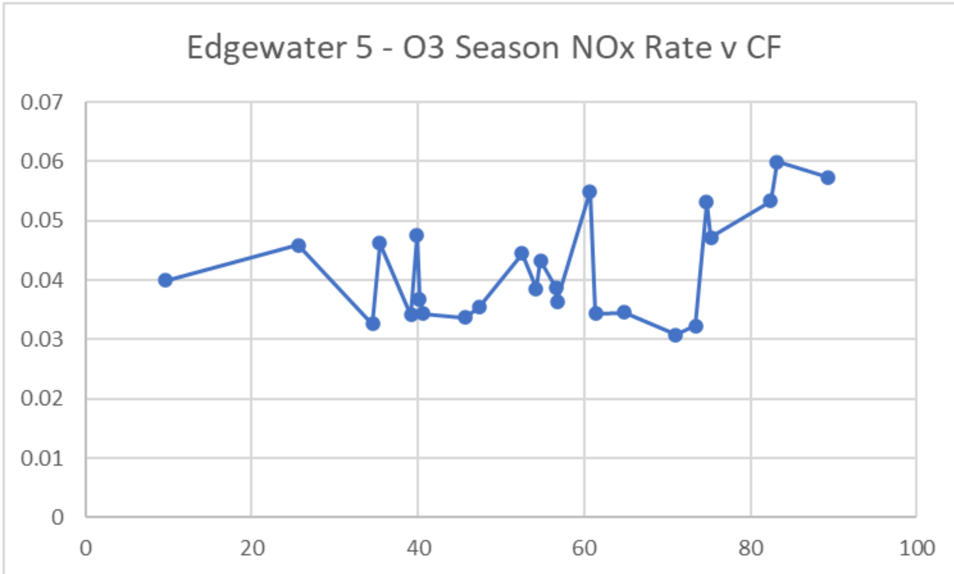
Wisconsin

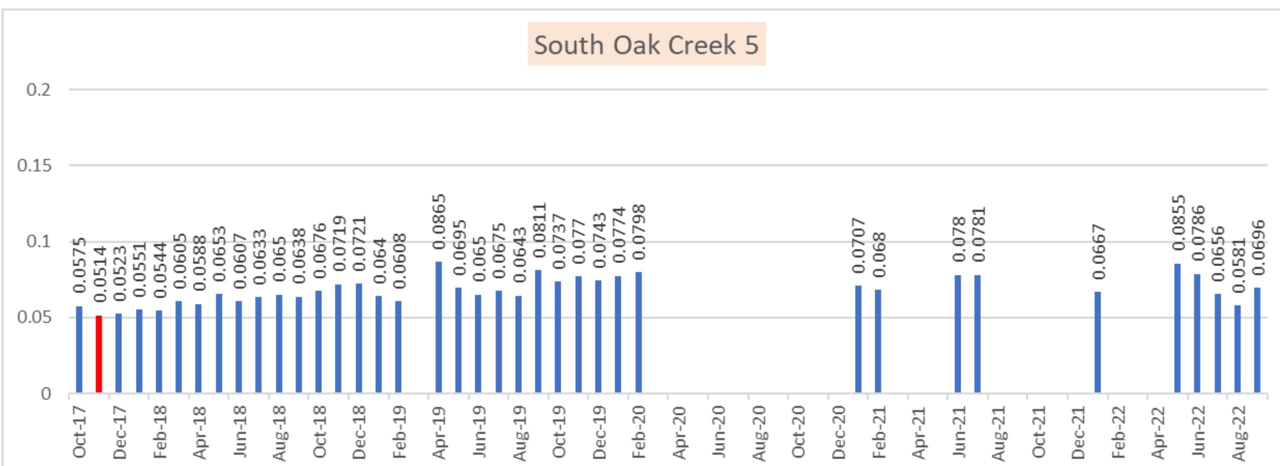
(A) Units with SCR

For Wisconsin, I address Unit 5 (approximately 380 MW) at the Edgewater plant and also Unit 5 (approximately 300 MW) at the South Oak Creek plant. Both of these units have existing SCRs. The summary of the NOx performance for these two units is shown in the table below. Both units are being operated with good NOx performance; however, as the NOx level for the maximum months shown below are greater than 0.07 lb/MMBtu, there remains room for improvement in SCR operation at each unit. In addition, the highest ozone season NOx level for the South Oak Creek Unit 5 is also greater than 0.07 lb/MMBtu.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max O3 Months
Edgewater	5	380	0.0273	0.0919	0.0599
South Oak Creek	5	300	0.0514	0.0865	0.0855




Edgewater 5 - O3 Season NOx Rate v CF
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
20
40
60
80
100


South Oak Creek 5
0.2
0.15
0.1
0.05
0
0.0575
0.0514
0.0523
0.0551
0.0544
0.0605
0.0588
0.0653
0.0607
0.0633
0.065
0.0638
0.0676
0.0719
0.0721
0.064
0.0608
0.0865
0.0695
0.065
0.0675
0.0643
0.0811
0.0737
0.077
0.0743
0.0774
0.0798
0.0707
0.068
0.078
0.0781
0.0667
0.0855
0.0786
0.0656
0.0581
0.0696
Oct-17
Dec-17
Feb-18
Apr-18
Jun-18
Aug-18
Oct-18
Dec-18
Feb-19
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Oct-19
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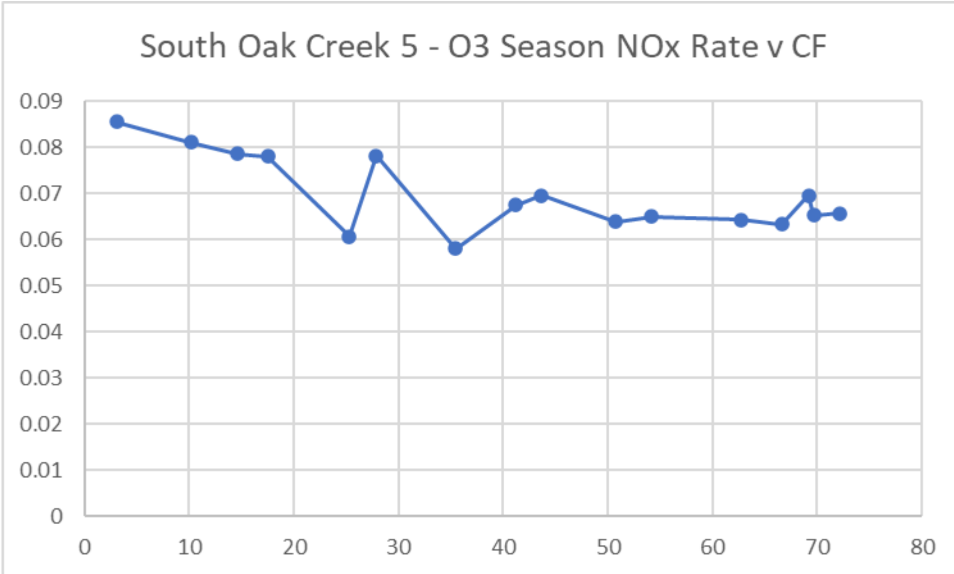
Apr-22
Jun-22
Aug-22

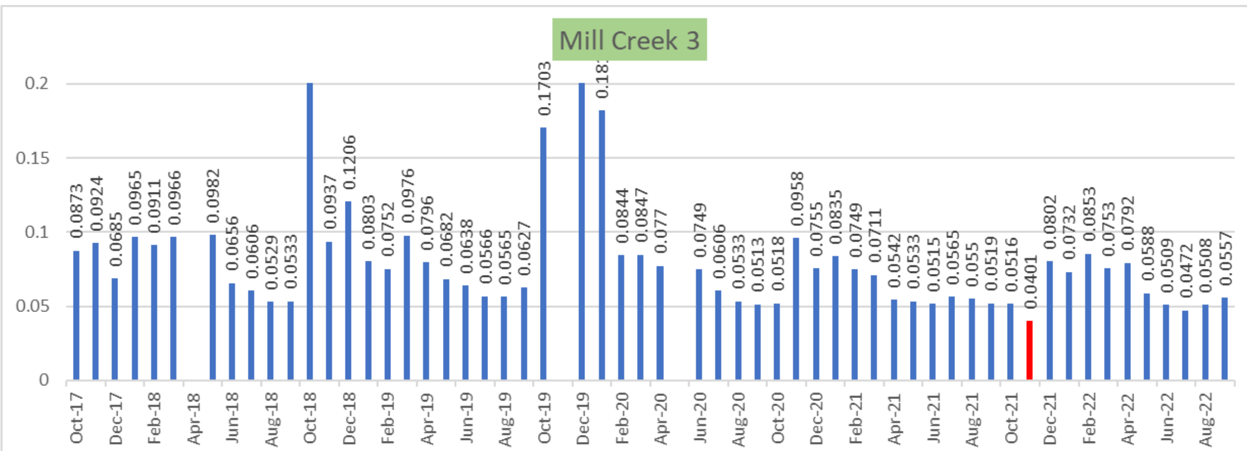

South Oak Creek 5 - O3 Season NOx Rate v CF
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
0
10
20
30
40
50
60
70
80

Kentucky

<u>(A) Units with SCR</u>

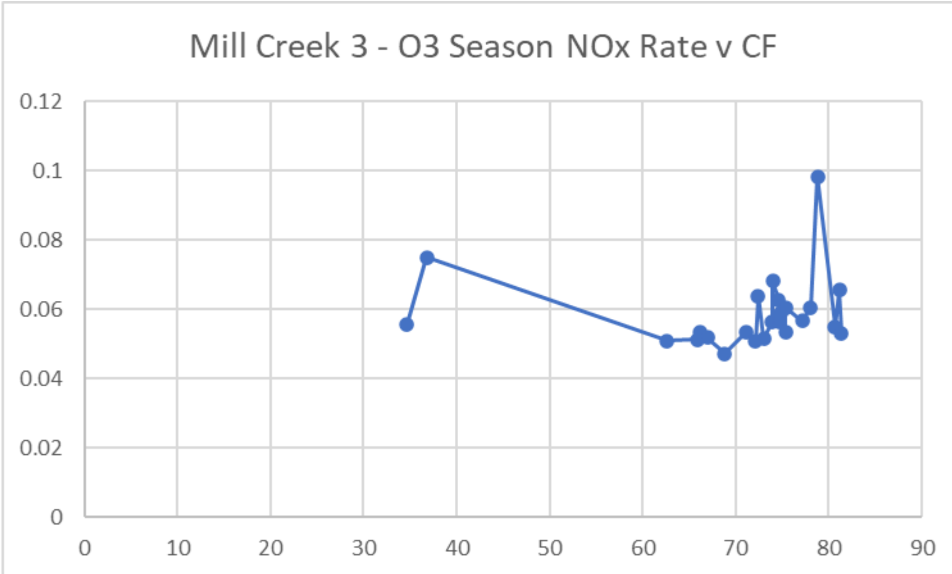
I analyzed Unit 3 (463 MW) and Unit 4 (544 MW) at the Mill Creek plant. These units have SCR installed. Each of them can clearly achieve reliably lower NOx emission rates. They are clearly not operating their SCRs according to the SCR's NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max O3 Months
Mill Creek, KY	3	463	0.0401	0.3172	0.0982
	4	544	0.0468	0.2422	0.0802

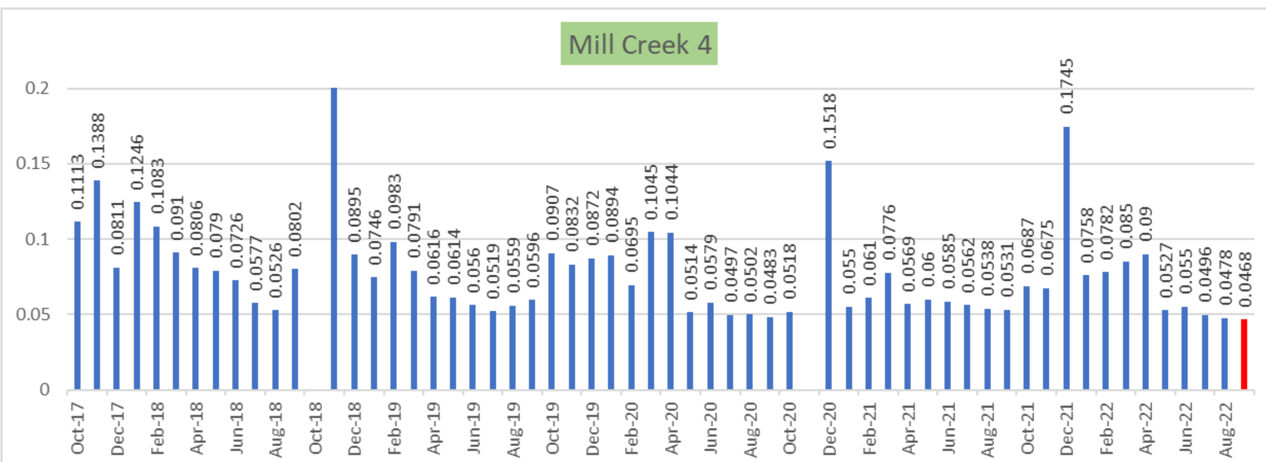


The chart above confirms that Mill Creek Unit 3 has achieved levels well below 0.07 lb/MMBtu on many months of recent operation, with a low of 0.04 lb/MMBtu, shown in red.

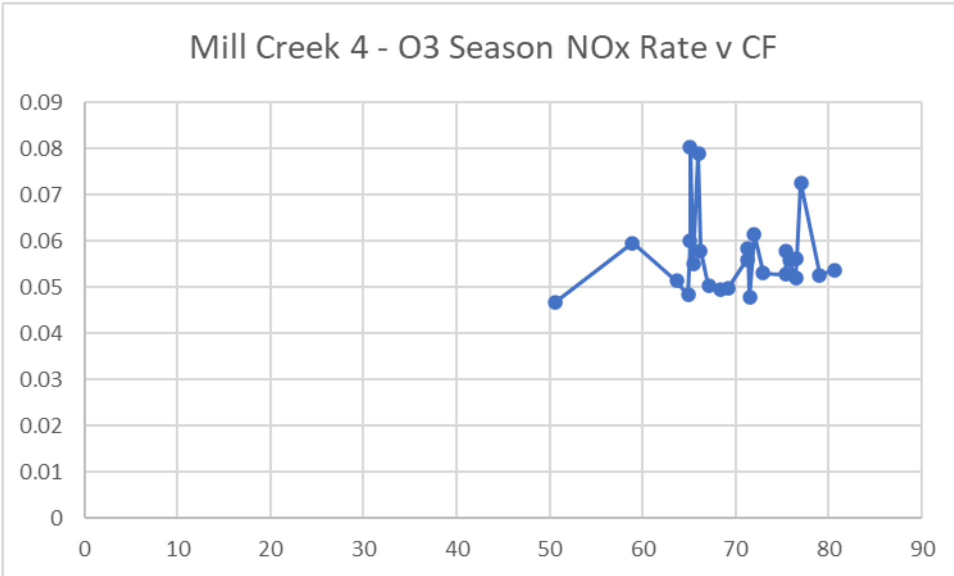
The chart below shows that Mill Creek Unit 3 has achieved less than 0.07 lb/MMBtu over a wide range of ozone-season operating capacity factors.



Similar to its sister unit, Mill Creek Unit 4 has also achieved NOx levels well below 0.07 lb/MMBtu as shown in the chart below. The low value of less than 0.047 lb/MMBtu is shown in red.



While Unit 4 has not operated at very low capacity factors during the ozone season, as shown in the chart below, it has operated below 0.07 lb/MMBtu across its range of operating capacity factors.



Based on the above, I conclude that Mill Creek Units 3 and 4 can operate their SCRs and achieve monthly average NOx levels of 0.07 lb/MMBtu.

(B) Units Without SCR

For Kentucky, I analyzed Unit 1 (463 MW) and Unit 2 (544 MW) at the Mill Creek plant. The summary of the cost-effectiveness for SCRs at these units is shown in the table below. I have previously discussed the various inputs, and their general conservativeness earlier. The cost-effectiveness is calculated to be $4,148 per ton of NOx reduced for Mill Creek 1 and $4,100 per ton of NOx reduced for Mill Creek 2. As such SCR is highly cost-effective for these units.

SUMMARY OF SCR COST-EFFECTIVENESS								
Plant	Unit	UnitSize [1]	MedianNOx [2]	SCREff	PostSCRNOx	CapFac [3]	SCR CE [4]	SCR CE w/Multi-unit Discount [5]
Mill Creek	1	356	0.280	80	0.056	68.7	$ 4,879	$ 4,148
Mill Creek	2	356	0.283	80	0.057	68.5	$ 4,824	$ 4,100

[1] UnitSize	MW
[2] MedianNOx	2018-Sep 2022 Monthly NOx (lb/MMBtu)
[3] CapFac	Maximum of: Median Monthly 2017-2021 or Jan-Oct 2022
[4] SCR CE	SCR Cost-Effectiveness, $/ton

[5] Multi-unit discount assumed to be 15% lower.

Missouri

(A) Units Without SCR

For Missouri I analyzed Units 1-4 at the Labadie plant. The summary of the cost-effectiveness for SCRs at these units is shown in the table below. Again, I have previously discussed the various inputs, and their general conservativeness earlier. The cost-effectiveness is calculated to be between $11,904 and $12,559 per ton of NOx reduced for the four Labadie units. Again SCR is cost-effective for these units.

SUMMARY OF SCR COST-EFFECTIVENESS								
Plant	Unit	UnitSize [1]	MedianNOx [2]	SCREff	PostSCRNOx	CapFac [3]	SCR CE [4]	SCR CE w/Multi-unit Discount [5]
Labadie	1	574	0.092	60	0.037	82.1	$ 14,206	$ 12,075
Labadie	2	574	0.093	60	0.037	78.8	$ 14,578	$ 12,392
Labadie	3	621	0.095	60	0.038	79.1	$ 14,005	$ 11,904
Labadie	4	621	0.093	60	0.037	76.9	$ 14,774	$ 12,558

[1] UnitSize	MW
[2] MedianNOx	2018-Sep 2022 Monthly NOx (lb/MMBtu)
[3] CapFac	Maximum of: Median Monthly 2017-2021 or Jan-Oct 2022
[4] SCR CE	SCR Cost-Effectiveness, $/ton

[5] Multi-unit discount assumed to be 15% lower.

Colorado

(A) Units Without SCR

For Colorado I analyzed Units 1 at the Rawhide plant. The summary of the cost-effectiveness for SCRs at this unit is shown in the table below. Again, I have previously discussed the various inputs, and their general conservativeness earlier. The cost-effectiveness is calculated to be $11,114 per ton of NOx reduced. Therefore, SCR is cost-effective for this unit.

SUMMARY OF SCR COST-EFFECTIVENESS								
Plant	Unit	UnitSize [1]	MedianNOx [2]	SCREff	PostSCRNOx	CapFac [3]	SCR CE [4]	SCR CE w/Multi-unit Discount
Rawhide	1	294	0.118	70	0.035	82.3	$ 11,114	N/A

[1] UnitSize	MW
[2] MedianNOx	2018-Sep 2022 Monthly NOx (lb/MMBtu)
[3] CapFac	Maximum of: Median Monthly 2017-2021 or Jan-Oct 2022
[4] SCR CE	SCR Cost-Effectiveness, $/ton

Texas

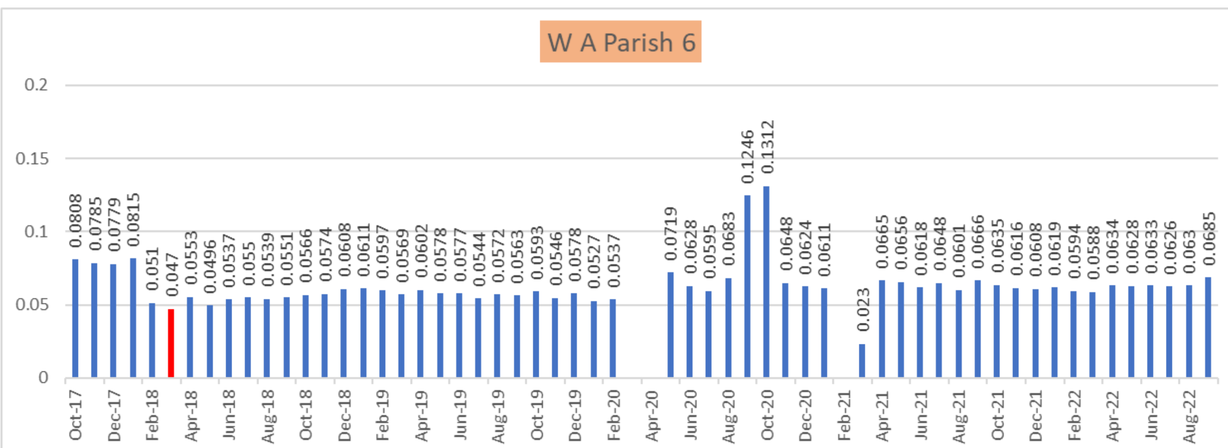
(A) Units with SCR

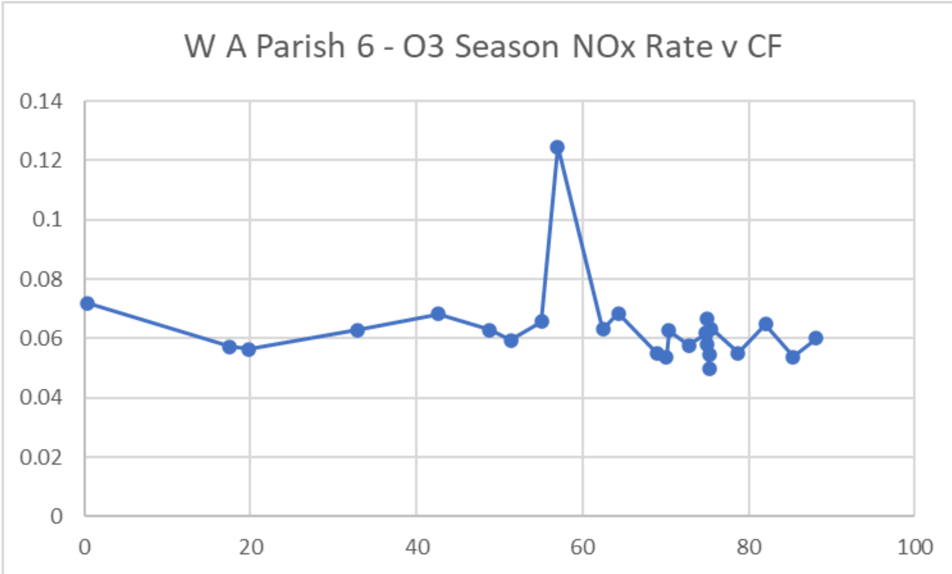
For units that have SCR already installed, I assessed Unit 6 (734 MW), Unit 7 (615 MW), and Unit 8 (654 MW) at the W. A. Parish plant. Each of them can clearly achieve reliably lower NOx emission rates. They are not operating their SCRs according to the SCR's NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the summary table below and the respective Unit-specific charts that follow clearly demonstrate.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max O3 Months
W A Parish, TX	6	734	0.047	0.1312	0.1246
	7	615	0.04	0.0976	0.0731
	8	654	0.0388	0.0846	0.0522

Note the minimum monthly NOx levels achieved by each of the three W A Parish units above – i.e., less than 0.05 lb/MMBtu.

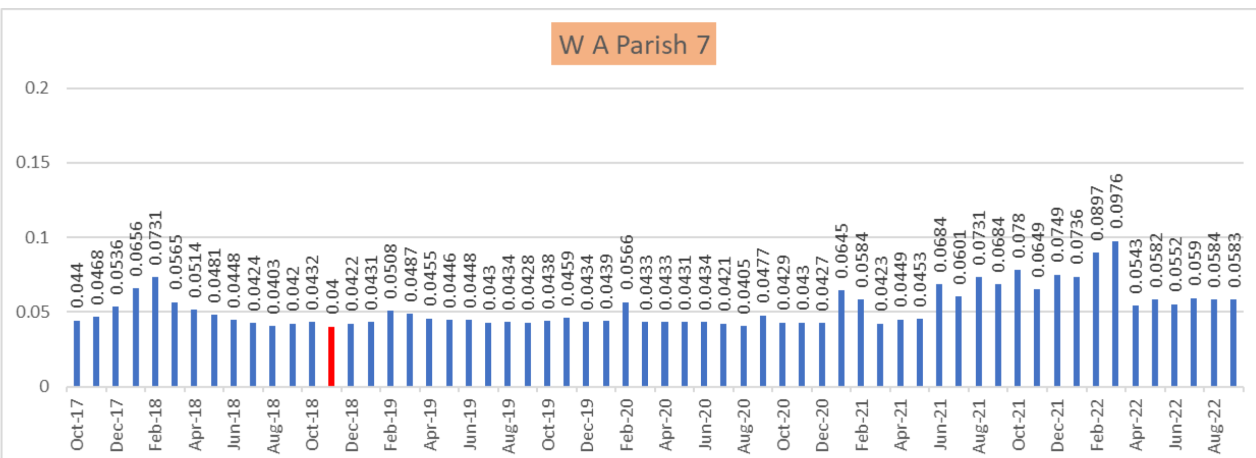
The monthly NOx chart for the last 60 months for Unit 6 is shown below, following by the NOx versus ozone season capacity factor chart for this unit .



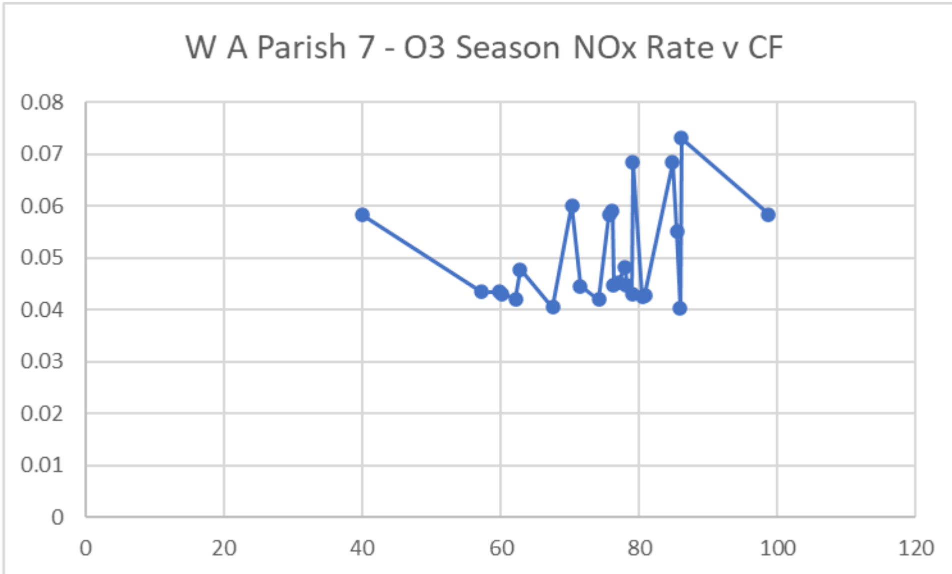


Both of the charts above confirm that Parish Unit 6 can achieve less than 0.07 lb/MMBtu monthly average NOx levels.

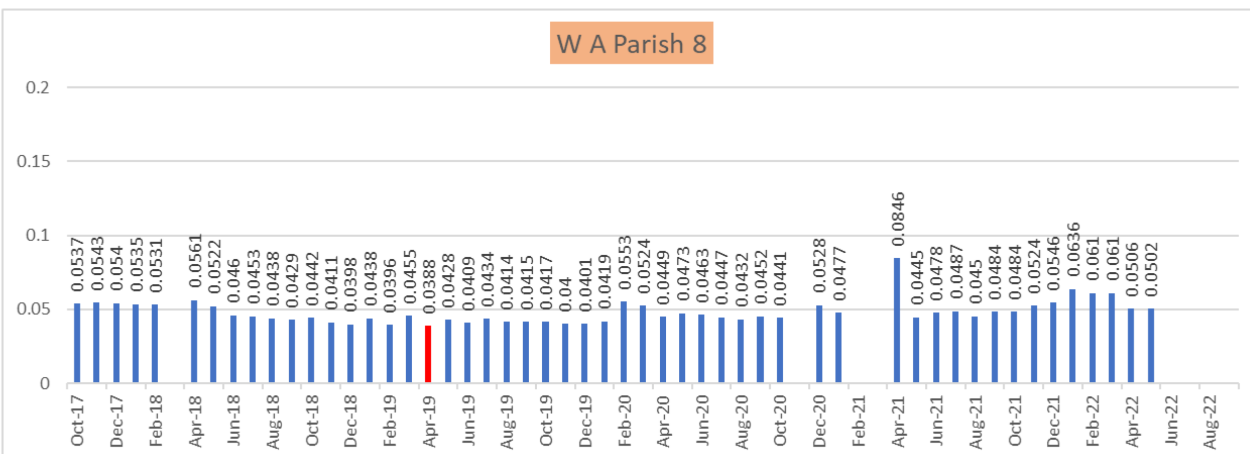
I reach a similar conclusion for Parish Unit 7 by reviewing its operating data as summarized in the two charts below. Monthly NOx levels have generally been less than 0.05 lb/MMBtu, with just a few months exceeding 0.07 lb/MMBtu in the last 60 months.



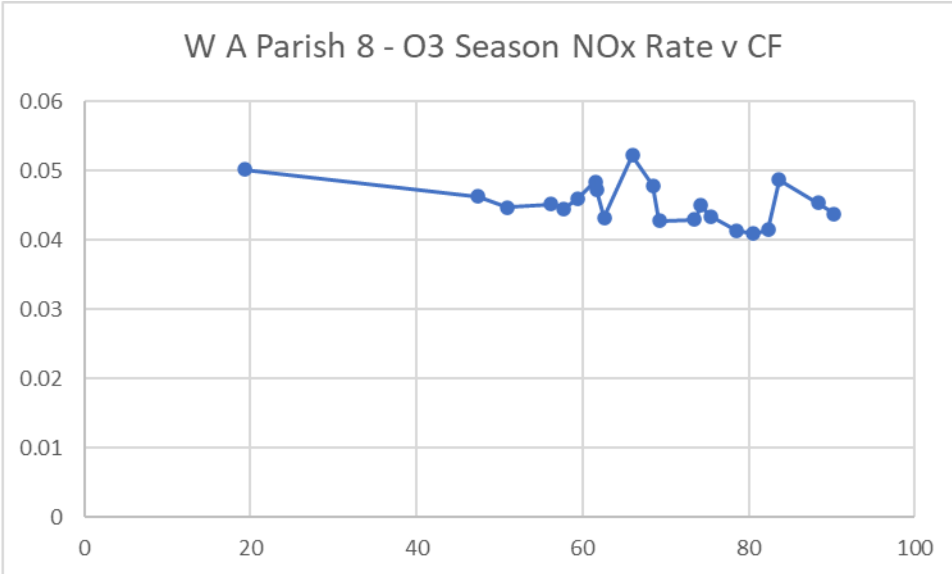
The chart below confirms that Unit 7 generally operates at a high ozone-season capacity factor and has no difficulty meeting monthly NOx levels of 0.07 lb/MMBtu.



The demonstrated NOx performance of Parish Unit 8 is also like that of Unit 7 above. Over the last 60 months the unit has generally maintained NOx levels of less than 0.05 lb/MMBtu. I note that the unit has not operated recently due to a fire in the unit in the summer of 2022.



When operating in the ozone season, the capacity factors and NOx levels for Unit 8 are shown below. As the chart clearly shows the unit has met and can therefore meet NOx levels of less than 0.07 lb/MMBtu across its operating monthly capacity factor range.



<u>I therefore conclude that W A Parish Units 6, 7, and 8 can achieve monthly-average NOx levels less than 0.07 lb/MMBtu with little additional effort.</u>

<u>(A) Units without SCR</u>

In addition to the three W A Parish units with existing SCRs that I address above, I also estimated the cost-effectiveness for a dozen Texas coal-fired units that currently operate without SCR.

I analyzed Unit 1 at JK Spruce (556 MW); Unit 1 (893 MW) and Unit 2 (957 MW) at Limestone; Unit 1 (793 MW), Unit 2 (793 MW), and Unit 3 (793 MW) at Martin Lake; Unit 1 (615 MW), Unit 2 (615 MW), and Unit 3 (460 MW) at Sam Seymour/Fayette; Units 1 and 2 at Tolk (568 MW each); and Unit 1 (416MW) at San Miguel. The summary of the cost-effectiveness for SCRs at each of these units is shown in the table below. Again, I have previously discussed the various inputs, and their general conservativeness earlier. The cost-effectiveness for every unit except Tolk 1 and 2 is calculated to be below $9,000 per ton of NOx reduced, with a very modest multi-unit discount on the SCR capital cost (15%) as noted prior. As such SCR is very cost-effective for these units. The cost-effectiveness for Tolk Units 1 and 2 are each below $12,000, indicating that SCRs are also cost effective at the two Tolk units as well, when compared to previous cost effectiveness decisions by regulatory agencies at other plants.

SUMMARY OF SCR COST-EFFECTIVENESS								
Plant	Unit	UnitSize [1]	MedianNOx [2]	SCREff	PostSCRNOx	CapFac [3]	SCR CE [4]	SCR CE w/Multi-unit Discount [5]
J K Spruce	1	556	0.146	70	0.044	69.5	$ 9,255	
Limestone	1	893	0.152	70	0.045	55.1	$ 10,501	$ 8,926
Limestone	2	957	0.168	70	0.050	63	$ 8,411	$ 7,149
Martin Lake	1	793	0.151	70	0.045	62.6	$ 9,538	$ 8,108
Martin Lake	2	793	0.152	70	0.046	60.1	$ 9,838	$ 8,362
Martin Lake	3	793	0.144	70	0.043	66	$ 9,618	$ 8,175
Sam Seymour	1	615	0.125	70	0.037	74.5	$ 10,158	$ 8,634
Sam Seymour	2	615	0.114	70	0.034	76.6	$ 10,573	$ 8,987
Sam Seymour	3	460	0.126	70	0.038	86.8	$ 8,927	$ 7,588
Tolk	1	568	0.161	80	0.032	35.6	$ 14,029	$ 11,925
Tolk	2	568	0.156	80	0.031	36.8	$ 13,903	$ 11,818
San Miguel	1	410	0.156	70	0.047	76.8	$ 8,273	

[1] UnitSize	MW
[2] MedianNOx	2018-Sep 2022 Monthly NOx (lb/MMBtu)
[3] CapFac	Maximum of: Median Monthly 2017-2021 or Jan-Oct 2022
[4] SCR CE	SCR Cost-Effectiveness, $/ton

[5] Multi-unit discount assumed to be 15% lower.

Appendix A[3]

Excerpts Addressing SCR Performance to Obtain Low NOx Levels

[3] Appendix A contains excerpts of a prior report I have authored. The entire report is available at https://www.regulations.gov/comment/EPA-HQ-OAR-2021-0668-0758

F. Strategies to Achieve Better SCR Performance and Lower NOx Levels

As noted earlier, an SCR, using specially formulated catalysts and relying on good mixing of the reducing agent (ammonia) and the exhaust gas containing NOx, prior to the introduction into the SCR itself, achieves high levels of NOx reduction as long as inlet gas temperatures are high enough for maintaining high catalyst activity and by avoiding damage to the catalysts such as by blocking the catalyst pores and/or chemically deactivating the catalyst.

As such since the heart of the NOx reduction occurs at the catalyst, the SCR itself (i.e.., the mechanical housing) and its age is of less significance, as long as it is maintained with some care.

It should be noted that all catalyst activity deteriorates over time due to inevitable degradation, especially for those catalyst layers that first see the incoming gas. In addition, the presence of pollutants such as sulfur compounds can adversely affect catalyst activity because reactions of such compounds and the ammonia reagent can cause a range of salts to form and deposit on the catalyst surfaces, which then inhibit NOx reduction.

Thus maintaining SCR activity requires an anticipation of likely deterioration mechanisms and accounting for them during operation. This includes factors such as proper catalyst management (i.e., rotating catalysts such that front layers are replaced by rear layers and/or sent to be rejuvenated or replaced) using actual activity data; managing and maintain high inlet gas temperatures above the so-called catalyst minimum operating temperature (MOT) while the load in the unit varies; and cycling the unit such that any deposition of ammonium salts can be reversed at higher gas temperatures.

There are myriad such strategies, with likely optimal combinations that can only be determined on a unit-specific analysis because of variabilities include coal type, type and age of the boiler, geometries and temperature profiles, and location of the SCR in the exhaust gas path, among some of the variables. While attempts were made, using vendor contacts, to ascertain which specific strategy/strategies may have been used at the units of interest in this analysis (i.e., those for which data were analyzed earlier) specific information was not forthcoming due to confidentiality reasons.

Thus, this section provides a general discussion of approaches that can be used to maintain good SCR catalyst performance with age and changing unit operation – i.e., with more cycling than baseload operations, at lower capacity factors.

F1. Catalyst Management

After design, which is not discussed in this report, proper catalyst management is essential for maintaining high levels of catalyst performance over time. Since catalyst deterioration over time is inevitable, it needs to be monitored and managed. The following figures are drawn from a major SCR catalyst vendor and illustrate the factors and concepts in catalyst management.

Figure 1 – SCR Catalyst Management Overview

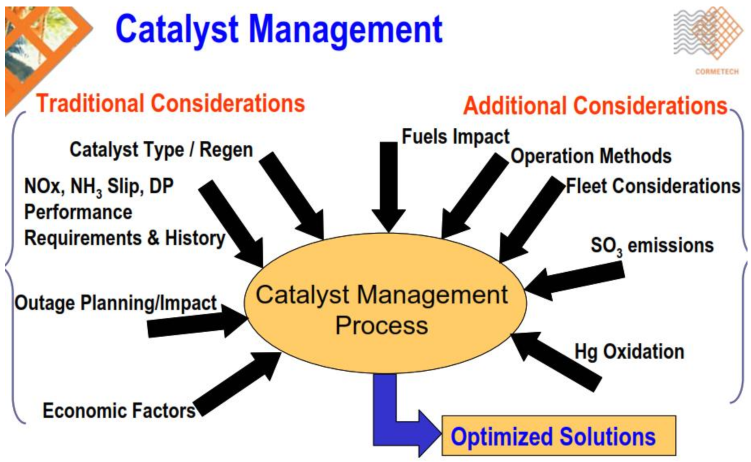
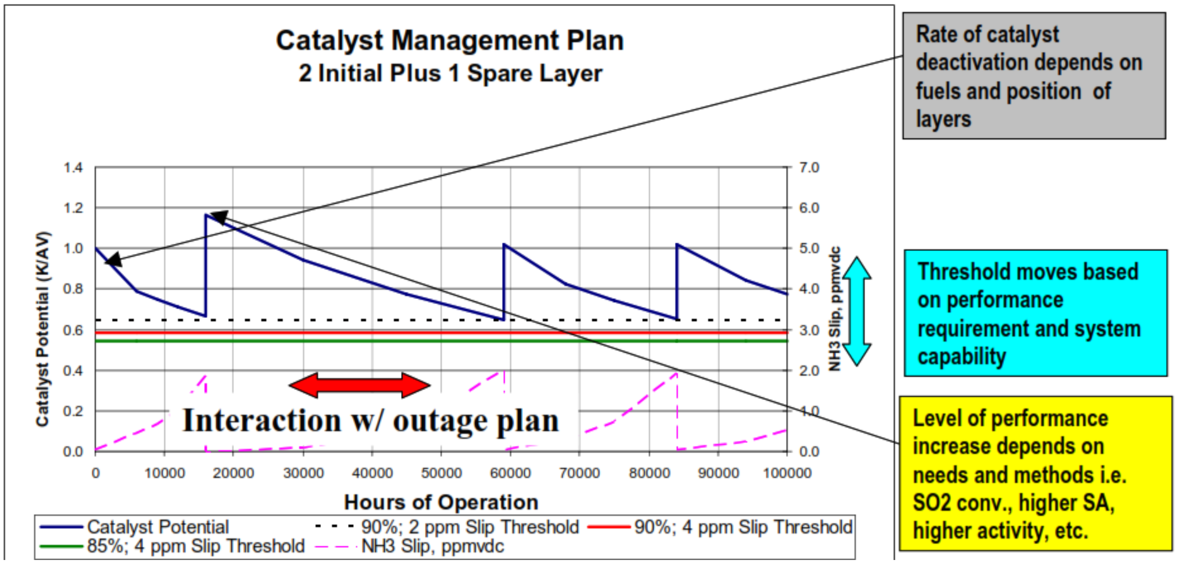


Figure 1 shows the many factors that are considered in properly managing catalyst activity to make sure it is maintained at a high level. Important technical factors that affect this include catalyst type (noted above), the quantity of catalyst (not noted above), the arrangements of the catalyst layers in the SCR along the gas path and the type of screens located ahead of the catalyst to ensure that the catalyst is not impacted by particulate matter (i.e., ash from the boiler) to the extent possible.[7]

Figure 2 below shows a conceptual catalyst management plan where the SCR contains space for three layers of catalyst along the gas path. The simple idea is that as the lead layer's performance deteriorates over time (the blue saw-tooth profile in the upper panel), it is replaced with catalyst from the other layers, and then either cleaned and regenerated or replaced with new catalyst.

[7] SCRs can be located in the so-called "high-dust" configuration in which the catalyst is placed prior to particulate matter controls such that the gas temperature is in the proper range for good catalyst operation. Dust management in this configuration is a critical factor in catalyst life and activity.

Figure 2 – Catalyst Management Plan Example



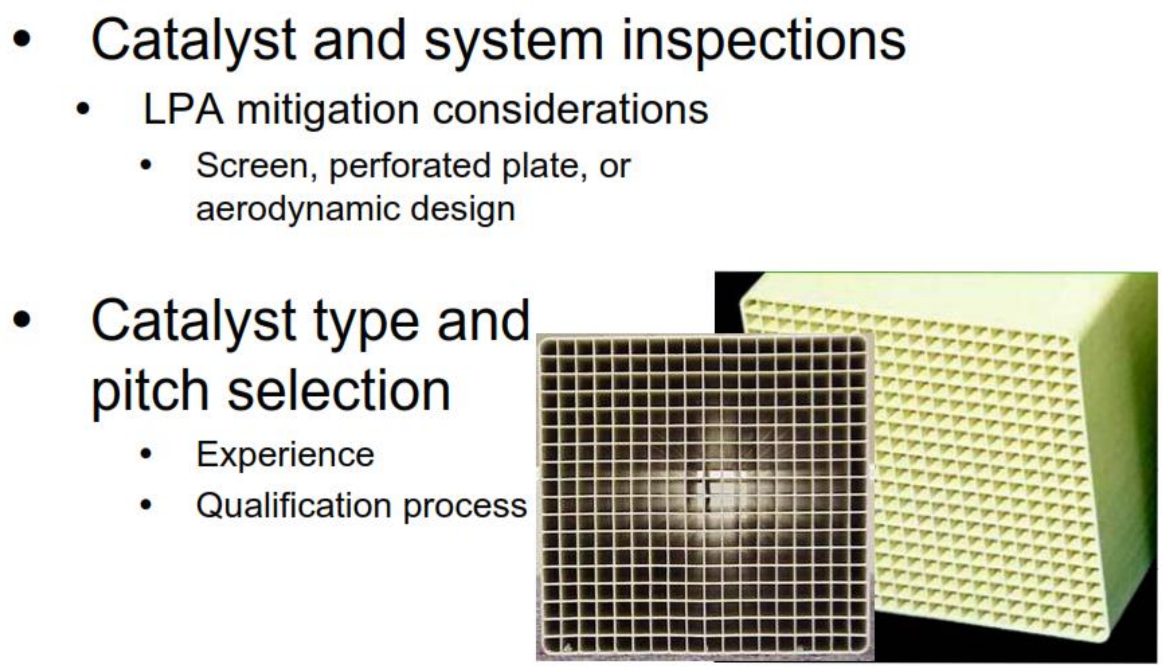
Of course catalyst management is useless without proper monitoring of the catalyst activity. Figures 3 and 4 below illustrate some basic concepts.

Figure 3 – Catalyst Testing

- Catalyst testing & sampling methodology
  - Full elements / plates from each layer
  - Molar ratio 1 vs. design MR
  - SO_2 conversion
    - Appropriate aging of samples
  - Qualification of regeneration process

- AIG Tuning/Distribution Measurement
  - Potential for AIG and mixing optimization

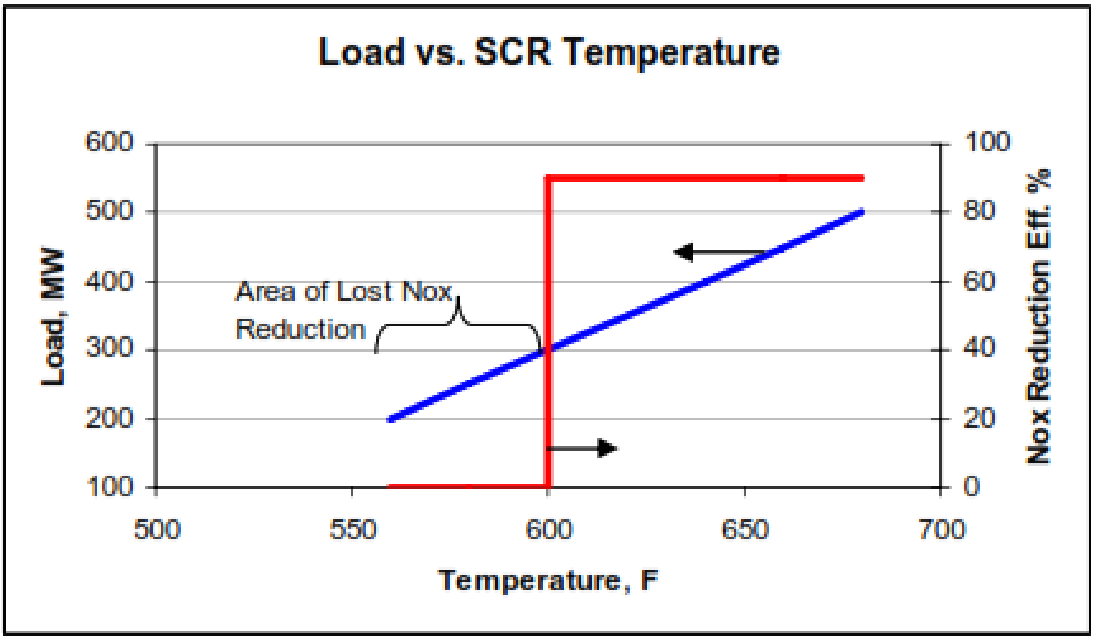
Figure 4 – Catalyst Inspection



<u>F2. Catalyst Performance and Inlet Temperature</u>

Like all catalysts, SCR catalysts require a minimum operating temperature (MOT) below which they have little activity – and therefore little NOx reduction. Therefore, it is important that catalysts with the lowest possible MOTs are selected (or substituted when older catalyst layers are replaced per the catalyst management discussion prior) and then temperatures above the MOT are maintained under the widest range of loads. This is shown conceptually in Figure 5 below. The MOT is assumed to be 600 F – and therefore there is 90% NOx reduction above that temperature and no reduction below that as shown in the red curve. The blue curve shows a unit's gas temperature at SCR inlet as a function of load. Thus, in this example, the SCR would not provide any NOx reduction below a unit load of 300 MW. If the red curve is shifted to the left – i.e., to lower temperatures - more NOx reduction can occur at lower loads, allowing for load cycling to lower loads. Conversely, if the blue curve is shifted to the right by increasing inlet temperature at lower loads, again more NOx reduction can occur at those lower loads.

Figure 5 – Unit Load and SCR Performance



An example of implementation of the strategy of lowering MOT is shown below in Figure 6 for Gibson Unit 1, a sister unit to Gibson Unit 2, whose NOx performance was previously reviewed.

Figure 6 – MOT reduction at Gibson Unit 1

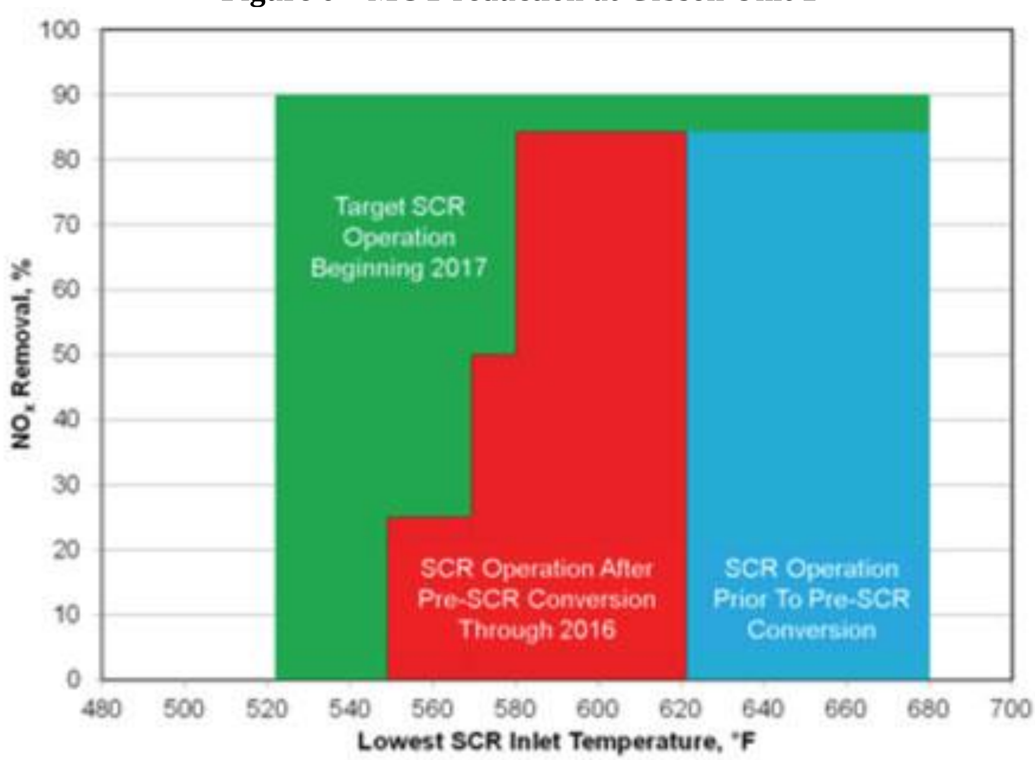
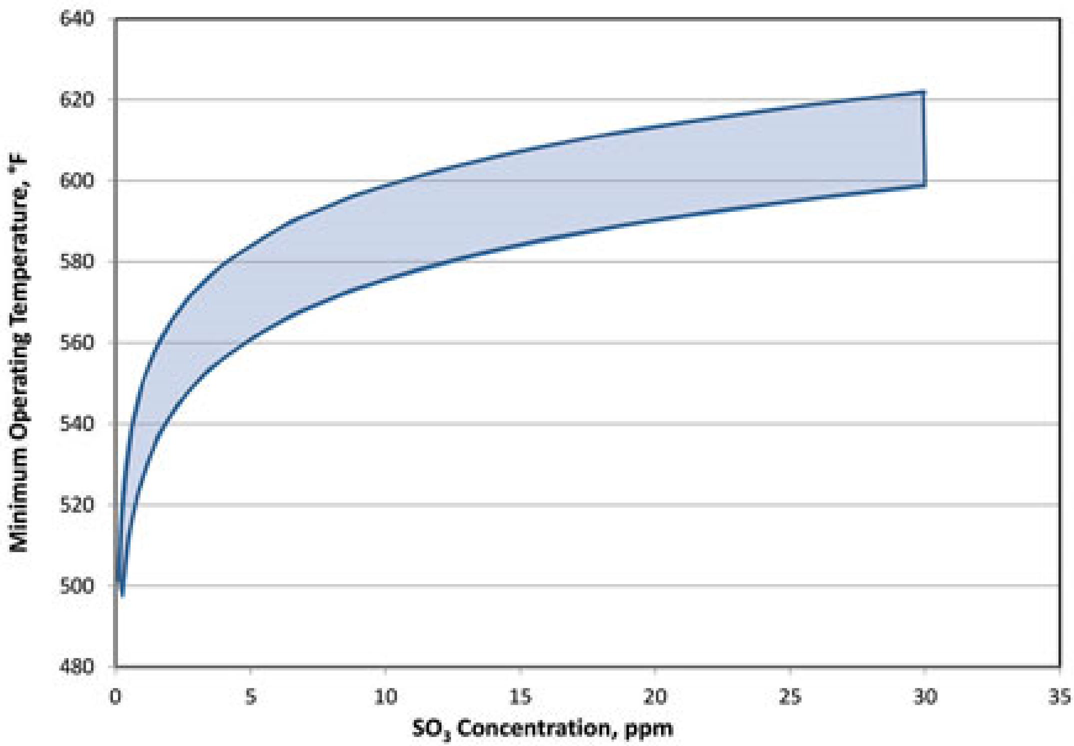


Figure 6 shows how the SCR inlet temperature, which was 550 – 620 F after SCR conversion through 2016, has been reduced to 520 F beginning 2017 – allowing for lower loads where higher levels of NOx can be reduced. The figure also shows that the SCR catalyst itself after 2017 provides higher NOx reduction (to 90%) compared to the earlier catalyst (85%).

One of the strategies to obtain lower MOT is to reduce the SO_3 that can be formed in the exhaust gases as discussed in the next section. If lower SO_3 levels can be maintained, the MOT can be lowered. A generic relationship between MOT and SO_3 concentrations is shown in Figure 7 below.

Figure 7 – Relationship between MOT and SO_3 Concentration



It has been reported that Duke Energy has obtained MOTs as low as 500 F at Gibson station by lowering SO_3 in the inlet gas using sorbent injection.[8]

Regarding the blue curve in Figure 5, additional strategies have been used to maintain high inlet gas temperatures (i.e., above MOT) under a range of loads. As noted in the literature,[9] one option

[8] https://www.power-eng.com/coal/boilers/scr-performance/#gref
Power Engineering, SCR Performance March 2017

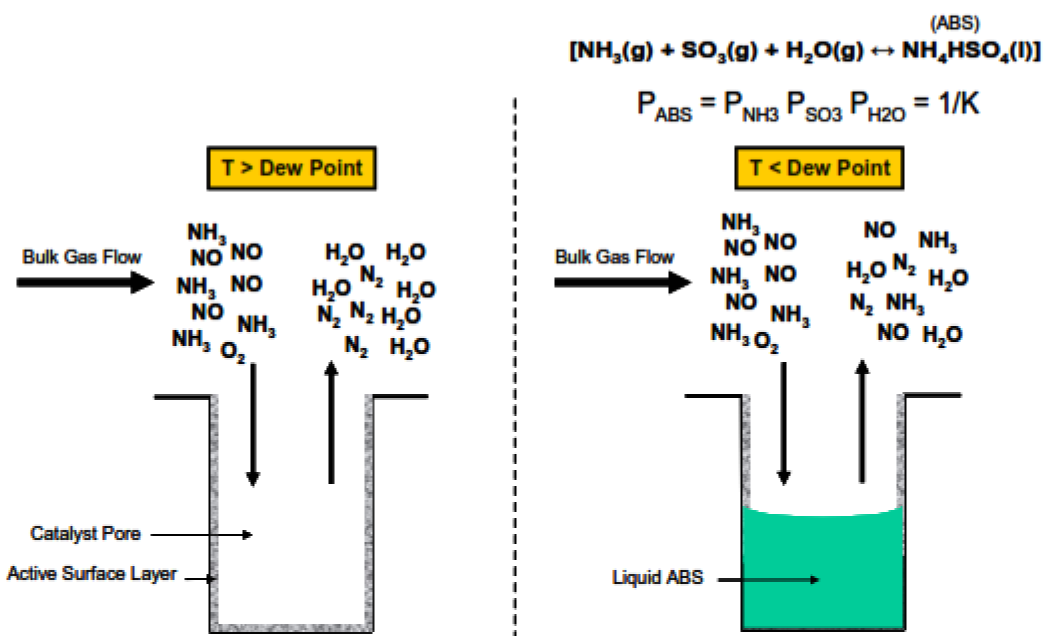
[9] https://www.powermag.com/scr-reheat-burners-keep-nox-in-spec-at-low-loads/
Power, March 1, 2015

is to install gas-side economizer bypass ductwork to divert a portion of the hot flue gas that would normally enter the economizer and send it directly to the inlet of the SCR. In other instances, direct reheating of the exhaust gases using so-called SCR reheat burners can increase the gas temperature to the SCR. These are installed in the ductwork.

F3. Reduction of SCR Catalyst Activity Due to Ammonium Salts

As noted briefly earlier, sulfur compounds in the exhaust gases can oxidize to SO_3 and then combine with ammonia to form several salts which can deposit in catalyst pores and therefore not allow NOx reduction in those areas of the catalyst. The concept is shown in Figure 8 below.

Figure 8 – Ammonium Salt Formation and Deposition



This salt formation is reversible however, allowing the catalyst activity to be regained. Simply increasing the gas temperature by increasing the unit load can reverse this phenomenon. Thus unit cycling to high capacity factors, which occurs normally in many cycling units, can mitigate this temporary loss of activity.

In some cases ensuring that the least amount of ammonia is used (and properly mixed and distributed across the catalyst layer) will minimize the ammonia slip and lead to the least amount of salt formation, if very low sulfur compounds are present. On the other hand, some amount of ammonia slip may be beneficial to NOx reduction if significant levels of sulfur compounds are present and if the resulting SO_3 can be reduced to avoid salt formation when the SO_3 reacts with ammonia. SO_3 removal upstream of the air heater, and ideally upstream of the SCR reactor itself, by injecting sorbents[10] (often used for MACT acid gas compliance) can be an important strategy at both high- and low-loads. For higher-load operation, the goal is to reduce SO_3 to very low levels prior to the SCR or even earlier at the air heater inlet. This relieves the constraint on ammonia slip because there is not enough SO_3 available to form appreciable amounts of salts. With the ammonia slip constraint relaxed, modest increases in ammonia slip are possible, which allows the NOx reduction efficiency to be increased. This illustrates the unit-specific nature of optimization.

F4. Upgraded Instrumentation and Automation

Maintaining proper process conditions, especially during cycling conditions, requires instrumentation and control systems that can react quickly to load changes, measure critical parameters such as inlet NOx concentrations, inlet gas temperatures, inlet SO_3 conditions, etc. and many other parameters and appropriately adjust inputs such as ammonia injection, using feedback loops. The role of upgrading instrumentation is therefore critical in achieving optimum SCR performance. Over time improvements in sensors, measurement software, optimization software, and the like, make it imperative that the instrumentation and controls that are installed in SCRs that are aging should be evaluated and upgraded in order to enable more current hardware and software to allow for greater control of key variables such as temperatures, in-line NOx and ammonia measurements, and the spatial distribution of these parameters in the SCR inlet duct.

A recent article discusses this in the context of Brandon Shores, whose strong NOx performance was noted earlier.[11]

Conclusion

There are numerous strategies that can be used to operate SCRs optimally at cycling units, including during low load operations.

[10] Of course using coal with lower sulfur levels, such as PRB coals will reduce SO_3 emissions all other parameters being the same.

[11] http://www.emersonautomationexperts.com/papers/Optimization-of-Emissions-Reduction-Equipment-SCR.pdf

Appendix B

Copy of Resume

RANAJIT (RON) SAHU, PH.D, CEM (NEVADA)

CONSULTANT, ENVIRONMENTAL AND ENERGY ISSUES

311 North Story Place
Alhambra, CA 91801
Phone: 702.683.5466
e-mail (preferred): ronsahu@gmail.com; sahuron@earthlink.net

EXPERIENCE SUMMARY

Dr. Sahu has over thirty two years of experience in the fields of environmental, mechanical, and chemical engineering including: program and project management services; design and specification of pollution control equipment for a wide range of emissions sources including stationary and mobile sources; soils and groundwater remediation including landfills as remedy; combustion engineering evaluations; energy studies; multimedia environmental regulatory compliance (involving statutes and regulations such as the Federal CAA and its Amendments, Clean Water Act, TSCA, RCRA, CERCLA, SARA, OSHA, NEPA as well as various related state statutes); transportation air quality impact analysis; multimedia compliance audits; multimedia permitting (including air quality NSR/PSD permitting, Title V permitting, NPDES permitting for industrial and storm water discharges, RCRA permitting, etc.), multimedia/multi-pathway human health risk assessments for toxics; air dispersion modeling; and regulatory strategy development and support including negotiation of consent agreements and orders.

He has over thirty years of project management experience and has successfully managed and executed hundreds of projects in this time period. This includes basic and applied research projects, design projects, regulatory compliance projects, permitting projects, energy studies, risk assessment projects, and projects involving the communication of environmental data and information to the public.

He has provided consulting services to numerous private sector, public sector and public interest group clients. His major clients over the past three decades include various trade associations as well as individual companies such as steel mills, petroleum refineries, chemical plants, cement manufacturers, aerospace companies, power generation facilities, lawn and garden equipment manufacturers, spa manufacturers, chemical distribution facilities, land development companies, and various entities in the public sector including EPA, the US Dept. of Justice, several states (including New York, New Jersey, Connecticut, Kansas, Oregon, New Mexico, Pennsylvania, and others), various agencies such as the California DTSC, and various cities and municipalities. Dr. Sahu has executed projects in all 50 US states, numerous local jurisdictions and internationally.

In addition to consulting, for approximately two decades, Dr. Sahu taught numerous courses in several Southern California universities as adjunct faculty, including UCLA (air pollution), UC Riverside (air pollution, process hazard analysis), and Loyola Marymount University (air pollution, risk assessment, hazardous waste management). He also taught at Caltech, his alma mater (various engineering courses), at the University of Southern California (air pollution controls) and at California State University, Fullerton (transportation and air quality).

Dr. Sahu has and continues to provide expert witness services in a number of environmental and engineering areas discussed above in both state and Federal courts as well as before administrative bodies (please see Annex A).

EXPERIENCE RECORD

2000-present **Independent Consultant.** Providing a variety of private sector (industrial companies, land development companies, law firms, etc.), public sector (such as the US Department of Justice), and public interest group clients with project management, environmental consulting, project management, as well as regulatory and engineering support consulting services.

1995-2000 Parsons ES, **Associate, Senior Project Manager and Department Manager for** Air Quality/Geosciences/Hazardous Waste Groups, Pasadena, CA.

Parsons ES, **Manager for Air Source Testing Services**. Responsible for the management of 8 individuals in the area of air source testing and air regulatory permitting projects located in Bakersfield, California.

1992-1995 Engineering-Science, Inc. **Principal Engineer and Senior Project Manager** in the air quality department.

1990-1992 Engineering-Science, Inc. **Principal Engineer and Project Manager** in the air quality department.

1989-1990 Kinetics Technology International, Corp. **Development Engineer.** Involved in thermal engineering R&D and project work related to low-NOx ceramic radiant burners, fired heater NOx reduction, SCR design, and fired heater retrofitting.

1988-1989 Heat Transfer Research, Inc. **Research Engineer**. Involved in the design of fired heaters, heat exchangers, air coolers, and other non-fired equipment. Also did research in the area of heat exchanger tube vibrations.

EDUCATION

1984-1988 Ph.D., Mechanical Engineering, California Institute of Technology (Caltech), Pasadena, CA.

1984 M. S., Mechanical Engineering, California Institute of Technology (Caltech), Pasadena, CA.

1978-1983 B. Tech (Honors), Mechanical Engineering, Indian Institute of Technology (IIT) Kharagpur, India

TEACHING EXPERIENCE

Caltech

"Thermodynamics," Teaching Assistant, California Institute of Technology, 1983, 1987.

"Air Pollution Control," Teaching Assistant, California Institute of Technology, 1985.

"Caltech Secondary and High School Saturday Program," - taught various mathematics (algebra through calculus) and science (physics and chemistry) courses to high school students, 1983-1989.

"Heat Transfer," - taught this course in the Fall and Winter terms of 1994-1995 in the Division of Engineering and Applied Science.

“Thermodynamics and Heat Transfer,” Fall and Winter Terms of 1996-1997.

U.C. Riverside, Extension

"Toxic and Hazardous Air Contaminants," University of California Extension Program, Riverside, California. Various years since 1992.

"Prevention and Management of Accidental Air Emissions," University of California Extension Program, Riverside, California. Various years since 1992.

"Air Pollution Control Systems and Strategies," University of California Extension Program, Riverside, California, Summer 1992-93, Summer 1993-1994.

"Air Pollution Calculations," University of California Extension Program, Riverside, California, Fall 1993-94, Winter 1993-94, Fall 1994-95.

"Process Safety Management," University of California Extension Program, Riverside, California. Various years since 1992-2010.

"Process Safety Management," University of California Extension Program, Riverside, California, at SCAQMD, Spring 1993-94.

"Advanced Hazard Analysis - A Special Course for LEPCs," University of California Extension Program, Riverside, California, taught at San Diego, California, Spring 1993-1994.

"Advanced Hazardous Waste Management" University of California Extension Program, Riverside, California. 2005.

Loyola Marymount University

"Fundamentals of Air Pollution - Regulations, Controls and Engineering," Loyola Marymount University, Dept. of Civil Engineering. Various years beginning 1993.

"Air Pollution Control," Loyola Marymount University, Dept. of Civil Engineering, Fall 1994.

"Environmental Risk Assessment," Loyola Marymount University, Dept. of Civil Engineering. Various years beginning 1998.

"Hazardous Waste Remediation" Loyola Marymount University, Dept. of Civil Engineering. Various years beginning 2006.

University of Southern California

"Air Pollution Controls," University of Southern California, Dept. of Civil Engineering, Fall 1993, Fall 1994.

"Air Pollution Fundamentals," University of Southern California, Dept. of Civil Engineering, Winter 1994.

University of California, Los Angeles

"Air Pollution Fundamentals," University of California, Los Angeles, Dept. of Civil and Environmental Engineering, Spring 1994, Spring 1999, Spring 2000, Spring 2003, Spring 2006, Spring 2007, Spring 2008, Spring 2009.

International Programs

"Environmental Planning and Management," 5 week program for visiting Chinese delegation, 1994.

"Environmental Planning and Management," 1 day program for visiting Russian delegation, 1995.

"Air Pollution Planning and Management," IEP, UCR, Spring 1996.

"Environmental Issues and Air Pollution," IEP, UCR, October 1996.

PROFESSIONAL AFFILIATIONS AND HONORS

President of India Gold Medal, IIT Kharagpur, India, 1983.

Member of the Alternatives Assessment Committee of the Grand Canyon Visibility Transport Commission, established by the Clean Air Act Amendments of 1990, 1992.

American Society of Mechanical Engineers: Los Angeles Section Executive Committee, Heat Transfer Division, and Fuels and Combustion Technology Division, 1987-mid-1990s.

Air and Waste Management Association, West Coast Section, 1989-mid-2000s.

PROFESSIONAL CERTIFICATIONS

EIT, California (#XE088305), 1993.

REA I, California (#07438), 2000.

Certified Permitting Professional, South Coast AQMD (#C8320), since 1993.

QEP, Institute of Professional Environmental Practice, 2000 - 2021.

CEM, State of Nevada (#EM-1699).

PUBLICATIONS (PARTIAL LIST)

"Physical Properties and Oxidation Rates of Chars from Bituminous Coals," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **67**, 275-283 (1988).

"Char Combustion: Measurement and Analysis of Particle Temperature Histories," with R.C. Flagan, G.R. Gavalas and P.S. Northrop, *Comb. Sci. Tech.* **60**, 215-230 (1988).

"On the Combustion of Bituminous Coal Chars," PhD Thesis, California Institute of Technology (1988).

"Optical Pyrometry: A Powerful Tool for Coal Combustion Diagnostics," *J. Coal Quality*, **8**, 17-22 (1989).

"Post-Ignition Transients in the Combustion of Single Char Particles," with Y.A. Levendis, R.C. Flagan and G.R. Gavalas, *Fuel*, **68**, 849-855 (1989).

"A Model for Single Particle Combustion of Bituminous Coal Char." Proc. ASME National Heat Transfer Conference, Philadelphia, **HTD-Vol. 106**, 505-513 (1989).

"Discrete Simulation of Cenospheric Coal-Char Combustion," with R.C. Flagan and G.R. Gavalas, *Combust. Flame*, **77**, 337-346 (1989).

"Particle Measurements in Coal Combustion," with R.C. Flagan, in "**Combustion Measurements**" (ed. N. Chigier), Hemisphere Publishing Corp. (1991).

"Cross Linking in Pore Structures and Its Effect on Reactivity," with G.R. Gavalas in preparation.

"Natural Frequencies and Mode Shapes of Straight Tubes," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Optimal Tube Layouts for Kamui SL-Series Exchangers," with K. Ishihara, Proprietary Report for Kamui Company Limited, Tokyo, Japan (1990).

"HTRI Process Heater Conceptual Design," Proprietary Report for Heat Transfer Research Institute, Alhambra, CA (1990).

"Asymptotic Theory of Transonic Wind Tunnel Wall Interference," with N.D. Malmuth and others, Arnold Engineering Development Center, Air Force Systems Command, USAF (1990).

"Gas Radiation in a Fired Heater Convection Section," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1990).

"Heat Transfer and Pressure Drop in NTIW Heat Exchangers," Proprietary Report for Heat Transfer Research Institute, College Station, TX (1991).

"NOx Control and Thermal Design," Thermal Engineering Tech Briefs, (1994).

“From Purchase of Landmark Environmental Insurance to Remediation: Case Study in Henderson, Nevada,” with Robin E. Bain and Jill Quillin, presented at the AQMA Annual Meeting, Florida, 2001.

"The Jones Act Contribution to Global Warming, Acid Rain and Toxic Air Contaminants," with Charles W. Botsford, presented at the AQMA Annual Meeting, Florida, 2001.

PRESENTATIONS (PARTIAL LIST)

"Pore Structure and Combustion Kinetics - Interpretation of Single Particle Temperature-Time Histories," with P.S. Northrop, R.C. Flagan and G.R. Gavalas, presented at the AIChE Annual Meeting, New York (1987).

"Measurement of Temperature-Time Histories of Burning Single Coal Char Particles," with R.C. Flagan, presented at the American Flame Research Committee Fall International Symposium, Pittsburgh, (1988).

"Physical Characterization of a Cenospheric Coal Char Burned at High Temperatures," with R.C. Flagan and G.R. Gavalas, presented at the Fall Meeting of the Western States Section of the Combustion Institute, Laguna Beach, California (1988).

"Control of Nitrogen Oxide Emissions in Gas Fired Heaters - The Retrofit Experience," with G. P. Croce and R. Patel, presented at the International Conference on Environmental Control of Combustion Processes (Jointly sponsored by the American Flame Research Committee and the Japan Flame Research Committee), Honolulu, Hawaii (1991).

"Air Toxics - Past, Present and the Future," presented at the Joint AIChE/AAEE Breakfast Meeting at the AIChE 1991 Annual Meeting, Los Angeles, California, November 17-22 (1991).

"Air Toxics Emissions and Risk Impacts from Automobiles Using Reformulated Gasolines," presented at the Third Annual Current Issues in Air Toxics Conference, Sacramento, California, November 9-10 (1992).

"Air Toxics from Mobile Sources," presented at the Environmental Health Sciences (ESE) Seminar Series, UCLA, Los Angeles, California, November 12, (1992).

"Kilns, Ovens, and Dryers - Present and Future," presented at the Gas Company Air Quality Permit Assistance Seminar, Industry Hills Sheraton, California, November 20, (1992).

"The Design and Implementation of Vehicle Scrapping Programs," presented at the 86th Annual Meeting of the Air and Waste Management Association, Denver, Colorado, June 12, 1993.

"Air Quality Planning and Control in Beijing, China," presented at the 87th Annual Meeting of the Air and Waste Management Association, Cincinnati, Ohio, June 19-24, 1994.

Annex A

Expert Litigation Support

A. Occasions where Dr. Sahu has provided Written or Oral testimony before Congress:

1. In July 2012, provided expert written and oral testimony to the House Subcommittee on Energy and the Environment, Committee on Science, Space, and Technology at a Hearing entitled "Hitting the Ethanol Blend Wall – Examining the Science on E15."

B. Matters for which Dr. Sahu has provided affidavits and expert reports include:

2. Affidavit for Rocky Mountain Steel Mills, Inc. located in Pueblo Colorado – dealing with the technical uncertainties associated with night-time opacity measurements in general and at this steel mini-mill.

3. Expert reports and depositions (2/28/2002 and 3/1/2002; 12/2/2003 and 12/3/2003; 5/24/2004) on behalf of the United States in connection with the Ohio Edison NSR Cases. *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).

4. Expert reports and depositions (5/23/2002 and 5/24/2002) on behalf of the United States in connection with the Illinois Power NSR Case. *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).

5. Expert reports and depositions (11/25/2002 and 11/26/2002) on behalf of the United States in connection with the Duke Power NSR Case. *United States, et al. v. Duke Energy Corp.*, 1:00-CV-1262 (Middle District of North Carolina).

6. Expert reports and depositions (10/6/2004 and 10/7/2004; 7/10/2006) on behalf of the United States in connection with the American Electric Power NSR Cases. *United States, et al. v. American Electric Power Service Corp., et al.*, C2-99-1182, C2-99-1250 (Southern District of Ohio).

7. Affidavit (March 2005) on behalf of the Minnesota Center for Environmental Advocacy and others in the matter of the Application of Heron Lake BioEnergy LLC to construct and operate an ethanol production facility – submitted to the Minnesota Pollution Control Agency.

8. Expert Report and Deposition (10/31/2005 and 11/1/2005) on behalf of the United States in connection with the East Kentucky Power Cooperative NSR Case. *United States v. East Kentucky Power Cooperative, Inc*., 5:04-cv-00034-KSF (Eastern District of Kentucky).

9. Affidavits and deposition on behalf of Basic Management Inc. (BMI) Companies in connection with the BMI vs. USA remediation cost recovery Case.

10. Expert Report on behalf of Penn Future and others in the Cambria Coke plant permit challenge in Pennsylvania.

11. Expert Report on behalf of the Appalachian Center for the Economy and the Environment and others in the Western Greenbrier permit challenge in West Virginia.

12. Expert Report, deposition (via telephone on January 26, 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) in the Thompson River Cogeneration LLC Permit No. 3175-04 challenge.

13. Expert Report and deposition (2/2/07) on behalf of the Texas Clean Air Cities Coalition at the Texas State Office of Administrative Hearings (SOAH) in the matter of the permit challenges to TXU Project Apollo's eight new proposed PRB-fired PC boilers located at seven TX sites.

14. Expert Testimony (July 2007) on behalf of the Izaak Walton League of America and others in connection with the acquisition of power by Xcel Energy from the proposed Gascoyne Power Plant – at the State of Minnesota, Office of Administrative Hearings for the Minnesota PUC (MPUC No. E002/CN-06-1518; OAH No. 12-2500-17857-2).

15. Affidavit (July 2007) Comments on the Big Cajun I Draft Permit on behalf of the Sierra Club – submitted to the Louisiana DEQ.

16. Expert Report and Deposition (12/13/2007) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case. *Plaintiffs v. Allegheny Energy Inc., et al.,* 2:05cv0885 (Western District of Pennsylvania).

17. Expert Reports and Pre-filed Testimony before the Utah Air Quality Board on behalf of Sierra Club in the Sevier Power Plant permit challenge.

18. Expert Report and Deposition (October 2007) on behalf of MTD Products Inc., in connection with *General Power Products, LLC v MTD Products Inc*., 1:06 CVA 0143 (Southern District of Ohio, Western Division) .

19. Expert Report and Deposition (June 2008) on behalf of Sierra Club and others in the matter of permit challenges (Title V: 28.0801-29 and PSD: 28.0803-PSD) for the Big Stone II unit, proposed to be located near Milbank, South Dakota.

20. Expert Reports, Affidavit, and Deposition (August 15, 2008) on behalf of Earthjustice in the matter of air permit challenge (CT-4631) for the Basin Electric Dry Fork station, under construction near Gillette, Wyoming before the Environmental Quality Council of the State of Wyoming.

21. Affidavits (May 2010/June 2010 in the Office of Administrative Hearings))/Declaration and Expert Report (November 2009 in the Office of Administrative Hearings) on behalf of NRDC and the Southern Environmental Law Center in the matter of the air permit challenge for Duke Cliffside Unit 6. Office of Administrative Hearing Matters 08 EHR 0771, 0835 and 0836 and 09 HER 3102, 3174, and 3176 (consolidated).

22. Declaration (August 2008), Expert Report (January 2009), and Declaration (May 2009) on behalf of Southern Alliance for Clean Energy in the matter of the air permit challenge for Duke Cliffside Unit 6. *Southern Alliance for Clean Energy et al., v. Duke Energy Carolinas, LLC*, Case No. 1:08-cv-00318-LHT-DLH (Western District of North Carolina, Asheville Division).

23. Declaration (August 2008) on behalf of the Sierra Club in the matter of Dominion Wise County plant MACT.us

24. Expert Report (June 2008) on behalf of Sierra Club for the Green Energy Resource Recovery Project, MACT Analysis.

25. Expert Report (February 2009) on behalf of Sierra Club and the Environmental Integrity Project in the matter of the air permit challenge for NRG Limestone's proposed Unit 3 in Texas.

26. Expert Report (June 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al.*

27. Expert Report (August 2009) on behalf of Sierra Club and the Southern Environmental Law Center in the matter of the air permit challenge for Santee Cooper's proposed Pee Dee plant in South Carolina).

28. Statements (May 2008 and September 2009) on behalf of the Minnesota Center for Environmental Advocacy to the Minnesota Pollution Control Agency in the matter of the Minnesota Haze State Implementation Plans.

29. Expert Report (August 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

30. Expert Report and Rebuttal Report (September 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.

31. Expert Report (December 2009) and Rebuttal reports (May 2010 and June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

32. Pre-filed Testimony (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

33. Pre-filed Testimony (July 2010) and Written Rebuttal Testimony (August 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions*, No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

34. Expert Report (August 2010) and Rebuttal Expert Report (October 2010) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Liability Phase.

35. Declaration (August 2010), Reply Declaration (November 2010), Expert Report (April 2011), Supplemental and Rebuttal Expert Report (July 2011) on behalf of the United States in the matter of DTE Energy Company and Detroit Edison Company (Monroe Unit 2). *United States of America v. DTE Energy Company and Detroit Edison Company*, Civil Action No. 2:10-cv-13101-BAF-RSW (Eastern District of Michigan).

36. Expert Report and Deposition (August 2010) as well as Affidavit (September 2010) on behalf of Kentucky Waterways Alliance, Sierra Club, and Valley Watch in the matter of challenges to the NPDES permit issued for the Trimble County power plant by the Kentucky Energy and Environment Cabinet to Louisville Gas and Electric, File No. DOW-41106-047.

37. Expert Report (August 2010), Rebuttal Expert Report (September 2010), Supplemental Expert Report (September 2011), and Declaration (November 2011) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (District of Colorado).

38. Written Direct Expert Testimony (August 2010) and Affidavit (February 2012) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

39. Deposition (August 2010) on behalf of Environmental Defense, in the matter of the remanded permit challenge to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

40. Expert Report, Supplemental/Rebuttal Expert Report, and Declarations (October 2010, November 2010, September 2012) on behalf of New Mexico Environment Department (Plaintiff-Intervenor), Grand Canyon Trust and Sierra Club (Plaintiffs) in the matter of *Plaintiffs v. Public Service Company of New Mexico* (PNM), Civil No. 1:02-CV-0552 BB/ATC (ACE) (District of New Mexico).

41. Expert Report (October 2010) and Rebuttal Expert Report (November 2010) (BART Determinations for PSCo Hayden and CSU Martin Drake units) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

42. Expert Report (November 2010) (BART Determinations for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) to the Colorado Air Quality Commission on behalf of Coalition of Environmental Organizations.

43. Declaration (November 2010) on behalf of the Sierra Club in connection with the Martin Lake Station Units 1, 2, and 3. *Sierra Club v. Energy Future Holdings Corporation and Luminant*

Generation Company LLC, Case No. 5:10-cv-00156-DF-CMC (Eastern District of Texas, Texarkana Division).

44. Pre-Filed Testimony (January 2011) and Declaration (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

45. Declaration (February 2011) in the matter of the Draft Title V Permit for RRI Energy MidAtlantic Power Holdings LLC Shawville Generating Station (Pennsylvania), ID No. 17-00001 on behalf of the Sierra Club.

46. Expert Report (March 2011), Rebuttal Expert Report (June 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (District of Colorado).

47. Declaration (April 2011) and Expert Report (July 16, 2012) in the matter of the Lower Colorado River Authority (LCRA)'s Fayette (Sam Seymour) Power Plant on behalf of the Texas Campaign for the Environment. *Texas Campaign for the Environment v. Lower Colorado River Authority*, Civil Action No. 4:11-cv-00791 (Southern District of Texas, Houston Division).

48. Declaration (June 2011) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.

49. Expert Report (June 2011) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).

50. Declaration (August 2011) in the matter of the Sandy Creek Energy Associates L.P. Sandy Creek Power Plant on behalf of Sierra Club and Public Citizen. *Sierra Club, Inc. and Public Citizen, Inc. v. Sandy Creek Energy Associates, L.P.*, Civil Action No. A-08-CA-648-LY (Western District of Texas, Austin Division).

51. Expert Report (October 2011) on behalf of the Defendants in the matter of *John Quiles and Jeanette Quiles et al. v. Bradford-White Corporation, MTD Products, Inc., Kohler Co., et al.*, Case No. 3:10-cv-747 (TJM/DEP) (Northern District of New York).

52. Declaration (October 2011) on behalf of the Plaintiffs in the matter of *American Nurses Association et. al. (Plaintiffs), v. US EPA (Defendant)*, Case No. 1:08-cv-02198-RMC (US District Court for the District of Columbia).

53. Declaration (February 2012) and Second Declaration (February 2012) in the matter of *Washington Environmental Council and Sierra Club Washington State Chapter v. Washington State Department of Ecology and Western States Petroleum Association*, Case No. 11-417-MJP (Western District of Washington).

54. Expert Report (March 2012) and Supplemental Expert Report (November 2013) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.*, Civil Action No. 4:10-cv-4969 (Southern District of Texas, Houston Division).

55. Declaration (March 2012) in the matter of *Center for Biological Diversity, et al. v. United States Environmental Protection Agency*, Case No. 11-1101 (consolidated with 11-1285, 11-1328 and 11-1336) (US Court of Appeals for the District of Columbia Circuit).

56. Declaration (March 2012) in the matter of *Sierra Club v. The Kansas Department of Health and Environment*, Case No. 11-105,493-AS (Holcomb power plant) (Supreme Court of the State of Kansas).

57. Declaration (March 2012) in the matter of the Las Brisas Energy Center *Environmental Defense Fund et al., v. Texas Commission on Environmental Quality,* Cause No. D-1-GN-11-001364 (District Court of Travis County, Texas, 261st Judicial District).

58. Expert Report (April 2012), Supplemental and Rebuttal Expert Report (July 2012), and Supplemental Rebuttal Expert Report (August 2012) on behalf of the states of New Jersey and Connecticut in the matter of the Portland Power plant *State of New Jersey and State of Connecticut (Intervenor-Plaintiff) v. RRI Energy Mid-Atlantic Power Holdings et al.*, Civil Action No. 07-CV-5298 (JKG) (Eastern District of Pennsylvania).

59. Declaration (April 2012) in the matter of the EPA's EGU MATS Rule, on behalf of the Environmental Integrity Project.

60. Expert Report (August 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana) – Harm Phase.

61. Declaration (September 2012) in the Matter of the Application of *Energy Answers Incinerator, Inc.* for a Certificate of Public Convenience and Necessity to Construct a 120 MW Generating Facility in Baltimore City, Maryland, before the Public Service Commission of Maryland, Case No. 9199.

62. Expert Report (October 2012) on behalf of the Appellants (Robert Concilus and Leah Humes) in the matter of Robert Concilus and Leah Humes v. Commonwealth of Pennsylvania Department of Environmental Protection and Crawford Renewable Energy, before the Commonwealth of Pennsylvania Environmental Hearing Board, Docket No. 2011-167-R.

63. Expert Report (October 2012), Supplemental Expert Report (January 2013), and Affidavit (June 2013) in the matter of various Environmental Petitioners v. North Carolina DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.

64. Pre-filed Testimony (October 2012) on behalf of No-Sag in the matter of the North Springfield Sustainable Energy Project before the State of Vermont, Public Service Board.

65. Pre-filed Testimony (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.

66. Expert Report (February 2013) on behalf of Petitioners in the matter of Credence Crematory, Cause No. 12-A-J-4538 before the Indiana Office of Environmental Adjudication.

67. Expert Report (April 2013), Rebuttal report (July 2013), and Declarations (October 2013, November 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC,* Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

68. Declaration (April 2013) on behalf of Petitioners in the matter of *Sierra Club, et al., (Petitioners) v Environmental Protection Agency et al. (Resppondents),* Case No., 13-1112, (Court of Appeals, District of Columbia Circuit).

69. Expert Report (May 2013) and Rebuttal Expert Report (July 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).

70. Declaration (August 2013) on behalf of A. J. Acosta Company, Inc., in the matter of *A. J. Acosta Company, Inc., v. County of San Bernardino*, Case No. CIVSS803651.

71. Comments (October 2013) on behalf of the Washington Environmental Council and the Sierra Club in the matter of the Washington State Oil Refinery RACT (for Greenhouse Gases), submitted to the Washington State Department of Ecology, the Northwest Clean Air Agency, and the Puget Sound Clean Air Agency.

72. Statement (November 2013) on behalf of various Environmental Organizations in the matter of the Boswell Energy Center (BEC) Unit 4 Environmental Retrofit Project, to the Minnesota Public Utilities Commission, Docket No. E-015/M-12-920.

73. Expert Report (December 2013) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

74. Expert Testimony (December 2013) on behalf of the Sierra Club in the matter of Public Service Company of New Hampshire Merrimack Station Scrubber Project and Cost Recovery, Docket No. DE 11-250, to the State of New Hampshire Public Utilities Commission.

75. Expert Report (January 2014) on behalf of Baja, Inc., in *Baja, Inc., v. Automotive Testing and Development Services, Inc. et. al*, Civil Action No. 8:13-CV-02057-GRA (District of South Carolina, Anderson/Greenwood Division).

76. Declaration (March 2014) on behalf of the Center for International Environmental Law, Chesapeake Climate Action Network, Friends of the Earth, Pacific Environment, and the Sierra Club (Plaintiffs) in the matter of *Plaintiffs v. the Export-Import Bank (Ex-Im Bank) of the United States*, Civil Action No. 13-1820 RC (District Court for the District of Columbia).

77. Declaration (April 2014) on behalf of Respondent-Intervenors in the matter of *Mexichem Specialty Resins Inc., et al., (Petitioners) v Environmental Protection Agency et al.,* Case No., 12-1260 (and Consolidated Case Nos. 12-1263, 12-1265, 12-1266, and 12-1267), (Court of Appeals, District of Columbia Circuit).

78. Direct Prefiled Testimony (June 2014) on behalf of the Michigan Environmental Council and the Sierra Club in the matter of the Application of DTE Electric Company for Authority to Implement a Power Supply Cost Recovery (PSCR) Plan in its Rate Schedules for 2014 Metered Jurisdictional Sales of Electricity, Case No. U-17319 (Michigan Public Service Commission).

79. Expert Report (June 2014) on behalf of ECM Biofilms in the matter of the US Federal Trade Commission (FTC) v. ECM Biofilms (FTC Docket #9358).

80. Direct Prefiled Testimony (August 2014) on behalf of the Michigan Environmental Council and the Sierra Club in the matter of the Application of Consumers Energy Company for Authority to Implement a Power Supply Cost Recovery (PSCR) Plan in its Rate Schedules for 2014 Metered Jurisdictional Sales of Electricity, Case No. U-17317 (Michigan Public Service Commission).

81. Declaration (July 2014) on behalf of Public Health Intervenors in the matter of *EME Homer City Generation v. US EPA* (Case No. 11-1302 and consolidated cases) relating to the lifting of the stay entered by the Court on December 30, 2011 (US Court of Appeals for the District of Columbia).

82. Expert Report (September 2014), Rebuttal Expert Report (December 2014) and Supplemental Expert Report (March 2015) on behalf of Plaintiffs in the matter of *Sierra Club and Montana Environmental Information Center (Plaintiffs) v. PPL Montana LLC, Avista Corporation, Puget Sound Energy, Portland General Electric Company, Northwestern Corporation, and Pacificorp (Defendants)*, Civil Action No. CV 13-32-BLG-DLC-JCL (US District Court for the District of Montana, Billings Division).

83. Expert Report (November 2014) on behalf of Niagara County, the Town of Lewiston, and the Villages of Lewiston and Youngstown in the matter of CWM Chemical Services, LLC New York State Department of Environmental Conservation (NYSDEC) Permit Application Nos.: 9-2934-00022/00225, 9-2934-00022/00231, 9-2934-00022/00232, and 9-2934-00022/00249 (pending).

84. *Declaration (January 2015) relating to Startup/Shutdown in the MATS Rule (EPA Docket ID No. EPA-HQ-OAR-2009-0234) on behalf of the Environmental Integrity Project.*

85. Pre-filed Direct Testimony (March 2015), Supplemental Testimony (May 2015), and Surrebuttal Testimony (December 2015) on behalf of Friends of the Columbia Gorge in the matter of the Application for a Site Certificate for the Troutdale Energy Center before the Oregon Energy Facility Siting Council.

86. Brief of Amici Curiae Experts in Air Pollution Control and Air Quality Regulation in Support of the Respondents, On Writs of Certiorari to the US Court of Appeals for the District of Columbia, No. 14-46, 47, 48. *Michigan et. al., (Petitioners) v. EPA et. al., Utility Air Regulatory Group (Petitioners) v. EPA et. al., National Mining Association et. al., (Petitioner) v. EPA et. al.,* (Supreme Court of the United States).

87. Expert Report (March 2015) and Rebuttal Expert Report (January 2016) on behalf of Plaintiffs in the matter of *Conservation Law Foundation v. Broadrock Gas Services LLC, Rhode Island LFG GENCO LLC, and Rhode Island Resource Recovery Corporation (Defendants)*, Civil Action No. 1:13-cv-00777-M-PAS (US District Court for the District of Rhode Island).

88. Declaration (April 2015) relating to various Technical Corrections for the MATS Rule (EPA Docket ID No. EPA-HQ-OAR-2009-0234) on behalf of the Environmental Integrity Project.

89. Direct Prefiled Testimony (May 2015) on behalf of the Michigan Environmental Council, the Natural Resources Defense Council, and the Sierra Club in the matter of the Application of DTE Electric Company for Authority to Increase its Rates, Amend its Rate Schedules and Rules Governing the Distribution and Supply of Electric Energy and for Miscellaneous Accounting Authority, Case No. U-17767 (Michigan Public Service Commission).

90. Expert Report (July 2015) and Rebuttal Expert Report (July 2015) on behalf of Plaintiffs in the matter of *Northwest Environmental Defense Center et. al., v. Cascade Kelly Holdings LLC, d/b/a Columbia Pacific Bio-Refinery, and Global Partners LP (Defendants)*, Civil Action No. 3:14-cv-01059-SI (US District Court for the District of Oregon, Portland Division).

91. Declaration (August 2015, Docket No. 1570376) in support of "Opposition of Respondent-Intervenors American Lung Association, et. al., to Tri-State Generation's Emergency Motion;" Declaration (September 2015, Docket No. 1574820) in support of "Joint Motion of the State, Local Government, and Public Health Respondent-Intervenors for Remand Without Vacatur;" Declaration (October 2015) in support of "Joint Motion of the State, Local Government, and Public Health Respondent-Intervenors to State and Certain Industry Petitioners' Motion to Govern, *White Stallion Energy Center, LLC v. US EPA*, Case No. 12-1100 (US Court of Appeals for the District of Columbia).

92. Declaration (September 2015) in support of the Draft Title V Permit for Dickerson Generating Station (Proposed Permit No 24-031-0019) on behalf of the Environmental Integrity Project.

93. Expert Report (Liability Phase) (December 2015) and Rebuttal Expert Report (February 2016) on behalf of Plaintiffs in the matter of *Natural Resources Defense Council, Inc., Sierra Club, Inc., Environmental Law and Policy Center, and Respiratory Health Association v. Illinois Power Resources LLC, and Illinois Power Resources Generating LLC (Defendants)*, Civil Action No. 1:13-cv-01181 (US District Court for the Central District of Illinois, Peoria Division).

94. Declaration (December 2015) in support of the Petition to Object to the Title V Permit for Morgantown Generating Station (Proposed Permit No 24-017-0014) on behalf of the Environmental Integrity Project.

95. Expert Report (November 2015) on behalf of Appellants in the matter of *Sierra Club, et al. v. Craig W. Butler, Director of Ohio Environmental Protection Agency et al.*, ERAC Case No. 14-256814.

96. Affidavit (January 2016) on behalf of Bridgewatch Detroit in the matter of *Bridgewatch Detroit v. Waterfront Petroleum Terminal Co., and Waterfront Terminal Holdings, LLC.*, in the Circuit Court for the County of Wayne, State of Michigan.

97. Expert Report (February 2016) and Rebuttal Expert Report (July 2016) on behalf of the challengers in the matter of the Delaware Riverkeeper Network, Clean Air Council, et. al., vs. Commonwealth of Pennsylvania Department of Environmental Protection and R. E. Gas Development LLC regarding the Geyer well site before the Pennsylvania Environmental Hearing Board.

98. Direct Testimony (May 2016) in the matter of Tesoro Savage LLC Vancouver Energy Distribution Terminal, Case No. 15-001 before the State of Washington Energy Facility Site Evaluation Council.

99. Declaration (June 2016) relating to deficiencies in air quality analysis for the proposed Millenium Bulk Terminal, Port of Longview, Washington.

100. Declaration (December 2016) relating to EPA's refusal to set limits on PM emissions from coal-fired power plants that reflect pollution reductions achievable with fabric filters on behalf of Environmental Integrity Project, Clean Air Council, Chesapeake Climate Action Network, Downwinders at Risk represented by Earthjustice in the matter of *ARIPPA v EPA, Case No. 15-1180.* (D.C. Circuit Court of Appeals).

101. Expert Report (January 2017) on the Environmental Impacts Analysis associated with the Huntley and Huntley Poseidon Well Pad on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.

102. Expert Report (January 2017) on the Environmental Impacts Analysis associated with the Apex Energy Backus Well Pad on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.

103. Expert Report (January 2017) on the Environmental Impacts Analysis associated with the Apex Energy Drakulic Well Pad on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.

104. Expert Report (January 2017) on the Environmental Impacts Analysis associated with the Apex Energy Deutsch Well Pad on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.

105. Affidavit (February 2017) pertaining to deficiencies water discharge compliance issues at the Wood River Refinery in the matter of *People of the State of Illinois (Plaintiff) v. Phillips 66 Company*, *ConocoPhillips Company, WRB Refining LP (Defendants)*, Case No. 16-CH-656, (Circuit Court for the Third Judicial Circuit, Madison County, Illinois).

106. Expert Report (March 2017) on behalf of the Plaintiff pertaining to non-degradation analysis for waste water discharges from a power plant in the matter of *Sierra Club (Plaintiff) v. Pennsylvania Department of Environmental Protection (PADEP) and Lackawanna Energy Center*, Docket No. 2016-047-L (consolidated), (Pennsylvania Environmental Hearing Board).

107. Expert Report (March 2017) on behalf of the Plaintiff pertaining to air emissions from the Heritage incinerator in East Liverpool, Ohio in the matter of *Save our County (Plaintiff) v. Heritage Thermal Services, Inc. (Defendant), Case No. 4:16-CV-1544-BYP*, (US District Court for the Northern District of Ohio, Eastern Division).

108. Rebuttal Expert Report (June 2017) on behalf of Plaintiffs in the matter of *Casey Voight and Julie Voight (Plaintiffs) v Coyote Creek Mining Company LLC (Defendant),* Civil Action No. 1:15-CV-00109 (US District Court for the District of North Dakota, Western Division).

109. Expert Affidavit (August 2017) and Penalty/Remedy Expert Affidavit (October 2017) on behalf of Plaintiff in the matter of *Wildearth Guardians (Plaintiff) v Colorado Springs Utility Board (Defendant,)* Civil Action No. 1:15-cv-00357-CMA-CBS (US District Court for the District of Colorado).

110. Expert Report (August 2017) on behalf of Appellant in the matter of *Patricia Ann Troiano (Appellant) v. Upper Burrell Township Zoning Hearing Board (Appellee)*, Court of Common Pleas of Westmoreland County, Pennsylvania, Civil Division.

111. Expert Report (October 2017), Supplemental Expert Report (October 2017), and Rebuttal Expert Report (November 2017) on behalf of Defendant in the matter of *Oakland Bulk and Oversized Terminal (Plaintiff) v City of Oakland (Defendant,)* Civil Action No. 3:16-cv-07014-VC (US District Court for the Northern District of California, San Francisco Division).

112. Declaration (December 2017) on behalf of the Environmental Integrity Project in the matter of permit issuance for ATI Flat Rolled Products Holdings, Breckenridge, PA to the Allegheny County Health Department.

113. Expert Report (Harm Phase) (January 2018), Rebuttal Expert Report (Harm Phase) (May 2018) and Supplemental Expert Report (Harm Phase) (April 2019) on behalf of Plaintiffs in the matter of *Natural Resources Defense Council, Inc., Sierra Club, Inc., and Respiratory Health Association v. Illinois Power Resources LLC, and Illinois Power Resources Generating LLC (Defendants)*, Civil Action No. 1:13-cv-01181 (US District Court for the Central District of Illinois, Peoria Division).

114. Declaration (February 2018) on behalf of the Chesapeake Bay Foundation, et. al., in the matter of the Section 126 Petition filed by the state of Maryland in *State of Maryland v. Pruitt (Defendant)*, Civil Action No. JKB-17-2939 (Consolidated with No. JKB-17-2873) (US District Court for the District of Maryland).

115. Direct Pre-filed Testimony (March 2018) on behalf of the National Parks Conservation Association (NPCA) in the matter of *NPCA v State of Washington, Department of Ecology and BP West Coast Products, LLC*, PCHB No. 17-055 (Pollution Control Hearings Board for the State of Washington.

116. Expert Affidavit (April 2018) and Second Expert Affidavit (May 2018) on behalf of Petitioners in the matter of *Coosa River Basin Initiative and Sierra Club (Petitioners) v State of Georgia Environmental Protection Division, Georgia Department of Natural Resources (Respondent) and Georgia Power Company (Intervenor/Respondent)*, Docket Nos: 1825406-BNR-WW-57-Howells and 1826761-BNR-WW-57-Howells, Office of State Administrative Hearings, State of Georgia.

117. Direct Pre-filed Testimony and Affidavit (December 2018) on behalf of Sierra Club and Texas Campaign for the Environment (Appellants) in the contested case hearing before the Texas State Office of Administrative Hearings in Docket Nos. 582-18-4846, 582-18-4847 (Application of GCGV Asset Holding, LLC for Air Quality Permit Nos. 146425/PSDTX1518 and 146459/PSDTX1520 in San Patricio County, Texas).

118. Expert Report (February 2019) on behalf of Sierra Club in the State of Florida, Division of Administrative Hearings, Case No. 18-2124EPP, Tampa Electric Company Big Bend Unit 1 Modernization Project Power Plant Siting Application No. PA79-12-A2.

119. Declaration (March 2019) on behalf of Earthjustice in the matter of comments on the renewal of the Title V Federal Operating Permit for Valero Houston refinery.

120. Expert Report (March 2019) on behalf of Plaintiffs for Class Certification in the matter of *Resendez et al v Precision Castparts Corporation* in the Circuit Court for the State of Oregon, County of Multnomah, Case No. 16cv16164.

121. Expert Report (June 2019), Affidavit (July 2019) and Rebuttal Expert Report (September 2019) on behalf of Appellants relating to the NPDES permit for the Cheswick power plant in the matter of *Three Rivers Waterkeeper and Sierra Club (Appellants) v. State of Pennsylvania Department of Environmental Protection (Appellee) and NRG Power Midwest (Permittee)*, before the Commonwealth of Pennsylvania Environmental Hearing Board, EHB Docket No. 2018-088-R.

122. Affidavit/Expert Report (August 2019) relating to the appeal of air permits issued to PTTGCA on behalf of Appellants in the matter of *Sierra Club (Appellants) v. Craig Butler, Director, et. al., Ohio EPA (Appellees)* before the State of Ohio Environmental Review Appeals Commission (ERAC), Case Nos. ERAC-19-6988 through -6991.

123. Expert Report (October 2019) relating to the appeal of air permit (Plan Approval) on behalf of Appellants in the matter of *Clean Air Council and Environmental Integrity Project (Appellants) v. Commonwealth of Pennsylvania Department of Environmental Protection and Sunoco Partners Marketing and Terminals L.P.*, before the Commonwealth of Pennsylvania Environmental Hearing Board, EHB Docket No. 2018-057-L.

124. Expert Report (December 2019), Affidavit (March 2020), Supplemental Expert Report (July 2020), and Declaration (February 2021) on behalf of Earthjustice in the matter of *Objection to the*

Issuance of PSD/NSR and Title V permits for Riverview Energy Corporation, Dale, Indiana, before the Indiana Office of Environmental Adjudication, Cause No. 19-A-J-5073.

125. Affidavit (December 2019) on behalf of Plaintiff-Intervenor (Surfrider Foundation) in the matter of *United States and the State of Indiana (Plaintiffs), Surfrider Foundation (Plaintiff-Intervenor), and City of Chicago (Plaintiff-Intervenor) v. United States Steel Corporation (Defendant),* Civil Action No. 2:18-cv-00127 (US District Court for the Northern District of Indiana, Hammond Division).

126. Declarations (January 2020, February 2020, May 2020, July 2020, and August 2020) and Pre-filed Testimony (April 2021) in support of Petitioner's Motion for Stay of PSCAA NOC Order of Approval No. 11386 in the matter of the *Puyallup Tribe of Indians v. Puget Sound Clean Air Agency (PSCAA) and Puget Sound Energy (PSE),* before the State of Washington Pollution Control Hearings Board, PCHB No. P19-088.

127. Expert Report (April 2020) on behalf of the plaintiff in the matter of Orion Engineered Carbons, GmbH (Plaintiff) vs. Evonik Operations, GmbH (formerly Evonik Degussa GmbH) (Respondent), before the German Arbitration Institute, Case No. DIS-SV-2019-00216.

128. Expert Independent Evaluation Report (June 2020) for *PacifiCorp's Decommissioning Costs Study Reports dated January 15, 2020 and March 13, 2020 relating to the closures of the Hunter, Huntington, Dave Johnston, Jim Bridger, Naughton, Wyodak, Hayden, and Colstrip (Units 3&4) plants*, prepared for the Oregon Public Utility Commission (Oregon PUC).

129. Direct Pre-filed Testimony (July 2020) on behalf of the Sierra Club in the matter of *the Application of the Ohio State University for a certificate of Environmental Compatibility and Public Need to Construct a Combined Heat and Power Facility in Franklin County, Ohio,* before the Ohio Power Siting Board, Case No. 19-1641-EL-BGN.

130. Expert Report (August 2020) and Rebuttal Expert Report (September 2020) on behalf of WildEarth Guardians (petitioners) in the matter of *the Appeals of the Air Quality Permit No. 7482-M1 Issued to 3 Bear Delaware Operating – NM LLC (EIB No. 20-21(A) and Registrations Nos. 8729, 8730, and 8733 under General Construction Permit for Oil and Gas Facilities (EIB No. 20-33 (A),* before the State of New Mexico, Environmental Improvement Board.

131. Expert Report (July 2020) on the *Initial Economic Impact Analysis (EIA) for A Proposal To* Regulate *NOx Emissions from Natural Gas Fired Rich-Burn Natural Gas Reciprocating Internal Combustion Engines (RICE) Greater Than 100 Horsepower* prepared on behalf of Earthjustice and the National Parks Conservation Association in the matter of Regulation Number 7, Alternate Rules before the Colorado Air Quality Control Commission.

132. Expert Report (August 2020) and Supplemental Expert Report (February 2021) on the Potential Remedies to Avoid Adverse Thermal Impacts from the Merrimack Station on behalf of Plaintiffs in the matter of *Sierra Club Inc. and the* Conservation *Law Foundation (Plaintiffs) v. Granite Shore Power, LLC et. al., (Defendants),* Civil Action No. 19-cv-216-JL (US District Court for the District of New Hampshire.)

133. Expert Report (August 2020) and Supplemental Expert Report (December 2020) on behalf of Plaintiffs in the matter of *PennEnvironment Inc., and Clean Air Council (Plaintiffs) and Allegheny County Health Department (Plaintiff-Intervenor) v. United States Steel Corporation (Defendant),* Civil Action No. 2-19-cv-00484-MJH (US District Court for the Western District of Pennsylvania.)

134. Pre-filed Direct Testimony (October 2020) and Sur-rebuttal Testimony (November 2020) on behalf of petitioners (Ten Persons Group, including citizens, the Town of Braintree, the Town of Hingham, and the City of Quincy) in the matter of Algonquin Gas Transmission LLC, Weymouth MA, No. X266786 Air Quality Plan Approval, before the Commonwealth of Massachusetts, Department of Environmental Protection, the Office of Appeals and Dispute Resolution, OADR Docket Nos. 2019-008, 2019-009, 2019010, 2019-011, 2019-012 and 2019-013.

135. Expert Report (November 2020) on behalf of Protect PT in the matter of *Protect PT v. Commonwealth of Pennsylvania Department of Environmental Protection and Apex Energy (PA) LLC*, before the Commonwealth of Pennsylvania Environmental Hearing Board, Docket No. 2018-080-R (consolidated with 2019-101-R)(the "Drakulic Appeal").

136. Expert Report (December 2020) on behalf of Plaintiffs in the matter of *Sierra Club Inc. (Plaintiff) v. GenOn Power Midwest LP (Defendants)*, Civil Action No. 2-19-cv-01284-WSS (US District Court for the Western District of Pennsylvania.)

137. Pre-filed Testimony (January 2021) on behalf of the Plaintiffs (Shrimpers and Fishermen of the Rio Grande Valley represented by Texas RioGrande Legal Aid, Inc.) in the matter of the Appeal of Texas Commission on Environmental Quality (TCEQ) Permit Nos. 147681, PSDTX1522, GHGPSDTX172 for the Jupiter Brownsville Heavy Condensate Upgrader Facility, Cameron County, before the Texas State Office of Administrative Hearings, SOAH Docket No. 582-21-0111, TCEQ Docket No. 2020-1080-AIR.

138. Expert Reports (March 2021 and May 2021) regarding the Aries Newark LLC Sludge Processing Facility, Application No. CPB 20-74, Central Planning Board, City of Newark, New Jersey.

139. Expert Report (April 2021) for *Charles Johnson Jr. (Plaintiff) v. BP Exploration and Production Inc., et. al. (Defendant)*, Civil Action No. 2:20-CV-01329 (Related to 12-968 BELO in MDL No. 2179). (US District Court for the Eastern District of Louisiana, New Orleans Division).

140. Expert Report (April 2021) for *Floyd Ruffin (Plaintiff), v. BP Exploration and Production Inc., et. al. (Defendant)*, Civil Action No. 2:20-cv-00334-CJB-JCW (US District Court for the Eastern District of Louisiana, New Orleans Division).

141. Expert Report (April 2021) and Sur-Rebuttal Report (June 2021) on behalf of the Plaintiffs in the matter of *Modern Holdings, LLC, et al. (Plaintiffs) v. Corning Inc., et al. (Defendants)*, Civil Action No. 5:13-cv-00405-GFVT, (US District Court for the Eastern District of Kentucky, Central Division at Lexington).

142. Expert Report (May 2021) for *Clifford Osmer (Plaintiff) v. BP Exploration and Production Inc., et. al., (Defendants)* related to No. 18-CV-12557 (US District Court for the Eastern District of Louisiana).

143. Expert Report (May 2021) and Rebuttal Expert Report (January 2022) for *James Noel (Plaintiff) v. BP Exploration and Production Inc., et. al. (Defendant)*, Civil Action No. 1:19-CV-00694-JB-MU-C (US District Court for the Southern District of Alabama, Southern Division).

144. Expert Report (June 2021) and Declarations (May 2021 and June 2021) on behalf of Plaintiffs in the matter of *Sierra Club (Plaintiff) v. Woodville Pellets, LLC (Defendant)*, Civil Action No. 9:20-cv-00178-MJT (US District Court for the Eastern District of Texas, Lufkin Division.)

145. Expert Witness Disclosure (June 2021) on behalf of the Plaintiffs in the matter of *Jay Burdick, et. al., (Plaintiffs) v. Tanoga Inc. (d/b/a Taconic) (Defendant)*, Index No. 253835, (State of New York Supreme Court, County of Rensselaer).

146. Expert Report (June 2021) on behalf of Appellants in the matter of *PennEnvironment and Earthworks (Appellants) v. Commonwealth of Pennsylvania Department of Environmental Protection (Appellee) and MarkWest Liberty Midstream and resource, LLC (Permittee)*, before the Commonwealth of Pennsylvania Environmental Hearing Board, EHB Docket No. 2020-002-R.

147. Expert Report (June 2021) for *Antonia Saavedra-Vargas (Plaintiff) v. BP Exploration and Production Inc., et. al. (Defendant)*, Civil Action No. 2:18-CV-11461 (US District Court for the Eastern District of Louisiana, New Orleans Division).

148. Affidavit (June 2021) for Lourdes Rubi in the matter of *Lourdes Rubi (Plaintiff) v. BP Exploration and Production Inc., et. al., (Defendants)*, related to 12-968 BELO in MDL No. 2179 (US District Court for the Eastern District of Louisiana, New Orleans Division).

149. Expert Report (June 2021) for *Wallace Smith (Plaintiff) v. BP Exploration and Production Inc., et. al. (Defendant)*, Civil Action No. 2:19-CV-12880 (US District Court for the Eastern District of Louisiana, New Orleans Division).

150. Declaration (July 2021) on behalf of Plaintiffs in the matter of *Stephanie Mackey and Nick Migliore, on behalf* of *themselves and all others similarly situated (Plaintiffs) v. Chemtool Inc. and Lubrizol Corporation (Defendants)*, Case No. 2021-L-0000165, State of Illinois, Circuit Court of the 17th Judicial Circuit, Winnebago County.

151. Declaration (July 2021, August 2021) on behalf of Petitioners in the matter of the Petition for a Hearing on the Merits Regarding Air Quality Permit No. 3340-RMD issued to New Mexico Terminal Services, LLC by *Mountain View Neighborhood Association et. al., (Petitioners) v. City of Albuquerque Environmental Health Department*, AQCB Petition No. 2020-1 before the Albuquerque-Bernalillo County Air Quality Control Board.

152. Expert Disclosure (September 2021) on behalf of the Plaintiffs in the matter of *State of New York, Town of Hempstead, Town of Brookhaven, Incorporated Village of Garden City and Long Island Power Authority et. al., (Plaintiffs) v. Covanta Hempstead Company et. al., (Defendants)*, Index No. 7549/2013 before the Supreme Court of the State of New York, County of Nassau.

153. Expert Report (October 2021) for *John A. Battiste (Plaintiff) v. BP Exploration and Production Inc., et. al. (Defendant)*, Civil Action No. 1:21-CV-00118 (US District Court for the Southern District of Alabama, Mobile Division)

154. Declaration/Expert Report (October 2021) for *Charles K. Grasley et. al., (Plaintiffs) v. Chemtool Incorporated (Defendant)*, Case No. 2021-L-0000162 (State of Illinois, In the Circuit Court of the 17th Judicial Circuit, Winnebago County).

155. Declaration (October 2021) and Expert Report (November 2021) on behalf of the Plaintiffs in the matter of Toll Brothers, Inc., and Porter Ranch Development Company (Plaintiffs) v. Sempra Energy, Southern California Gas Company et. al., (Defendants), Southern California [Aliso Canyon] Gas Leak Cases, JCCP No.: 4861, Lead Case No.: BC674622, Superior Court of the State of California for the County of Los Angeles.

156. Expert Report (November 2021) and Declaration (September 2022) on behalf of Plaintiffs in Re: Deepwater Horizon BELO Cases, Case No. 3:19cv963-MCR-GRJ (US District Court for the Northern District of Florida, Pensacola Division).

157. Declaration (November 2021) for the *United States of America and the State of Kansas, Department of Health and Environment (Plaintiffs) v. Coffeyville Resources Refining & Marketing, LLC (Defendant)*, Civ. No. 6:04-cv-01064-JAR-KGG (US District Court for the District of Kansas).

158. Expert Report/Affidavit (December 2021) on behalf of the City of Detroit in the matter of Marathon Petroleum Company (Claimant) v. City of Detroit Building Safety Engineering and Environmental Department, BSEED Case No. MCR 2018-2525, DAH Appeal No. 21-SWA-01, before the State of Michigan, City of Detroit Department of Appeals and Hearings.

159. Expert Report (December 2021) for *John Pabst (Plaintiff) v. BP Exploration and Production Inc., et. al. (Defendant)*, Civil Action No. 21-CV-00290 (US District Court for the Eastern District of Louisiana).

160. Expert Report (December 2021) for *Audrey Annette Tillery-Perdue individually and as person representative of the estate of Eddie Lewis Perdue (Plaintiff) v. BP Exploration and Production Inc., et. al., (Defendant)*, Civil Action No. 5:19-cv-00052-MCR-GRJ (US District Court for the Northern District of Florida, Pensacola Division).

161. Expert Report (February 2022) for *Richard Dufour (Plaintiff) v. BP Exploration and Production Inc., et. al. (Defendant)*, Civil Action No. 19-cv-00591 (US District Court for the Southern District of Mississippi).

162. Expert Report (February 2022) and Rebuttal Expert Report (June 2022, in preparation) for *Kamuda (Plaintiff) v. Sterigenics U.S., LLC, et. al., (Defendant)*, Case No. 2018-L-010475 (Circuit Court of Cook County, Illinois).

163. Expert Report (February 2022) in the matter of the *Appeal Petition for Hearing on Air Quality Permit No. 8585 on behalf of Earth Care New Mexico et. al., (Petitioners) v. New Mexico Environment Department and Associated Asphalt and Materials, LLC (Applicant)*, No. EIB 21-48 before the State of New Mexico Environmental Improvement Board.

164. Expert Report (March 2022) and Affidavit (June 2022) in the matter of Clean Air Council et. al., (Appellants) v. Commonwealth of Pennsylvania, Department of Environmental Protection (Appellee) and Renovo Energy Center (Permittee) EHB Docket No. 2021-055-R before the Commonwealth of Pennsylvania Environmental Hearing Board.

165. Declaration (March 2022) in the matter of Max Midstream Texas LLC Air Quality Permit No. 162941 for the Seahawk Crude Condensate Terminal in Calhoun County Texas, TCEQ Docket No. 2022-0157-AIR, before the Texas Commission on Environmental Quality.

166. Expert Pre-filed Testimony (April 2022) in the matter of Application of TPC Group LLC for New State and PSD Air Quality Permits (various), TCEQ Docket No. 2021-1422-AIR, SOAH Docket No. 582-22-0799, Before the Texas State Office of Administrative Hearings.

167. Expert Report (April 2022) and Rebuttal Report (August 2022) for *Teresa Fornek (Plaintiff) v. Sterigenics U.S., LLC, et. al., (Defendant)*, Case No. 2018-L-010744 (Circuit Court of Cook County, Illinois.)

168. Rule 26 Disclosure (May 2022) in the matter of the *Water Works and Sewer Board of the City of Gadsden (*Plaintiff*) v. 3M Company, et. al., (Defendants)*, Civil Action No.: 31 CV-2016-900676.00 (Circuit County of Etowah County, Alabama)

169. Expert Report (June 2022) for *Heather Schumacher (Plaintiff) v. Sterigenics U.S., LLC, et. al., (Defendant)*, Case No. 2018-L-011939 (Circuit Court of Cook County, Illinois.)

170. Expert Report (June 2022), Rebuttal Reports (August 2022, September 2022) for Plaintiffs in *Phylliss Grayson et. al. (Plaintiffs), v Lockheed Martin Corporation (Defendant),* Case No. 6:20-cv-01770. (US District Court for the Middle District of Florida – Orlando Division.)

171. Expert Affidavit (July 2022) for Center for Environmental Rights in connection with the 2019 South Africa Integrated Resource Plan in *African Climate Alliance et. al. v. The Minister of Mineral Resources and Energy et. al.*, in the High Court of South Africa, Gauteng Division, Pretoria.

172. Expert Affidavit (July 2022) for Center for Environmental Rights in connection with the Limpopo Mine (Lephalale Coal Mines Ltd.) in *Earthlife Africa v. The Minister of Forestry, Fisheries and Environment et. al.*, in the High Court of South Africa, Gauteng Division, Pretoria, Case No. 9149/2022.

173. Pre-filed Testimony (July 2022) and Rebuttal Testimony (September 2020) on behalf of the Puyallup Tribe of Indians in the matter of *Washington Utilities and Transportation Commission (Complainant) v. Puget Sound Energy (Respondent)* before the Washington Utilities and Transportation Commission, Docket UE-220066 and UG-220067 (Consolidated).

174. Expert Affidavit (October 2022) for *Concerned Citizens of Cook County GA (Petitioner) v. Georgia Department of Natural Resources (Respondent) and Spectrum Energy Georgia, LLC (Respondent Intervenor)* before the Office of State Administrative Hearings, State of Georgia, Docket No: 2303405-OSAH-BNR-AQ-37-Barnes.

C. Occasions where Dr. Sahu has provided oral testimony <u>in depositions, at trial or in similar proceedings</u> include the following:

175. Deposition on behalf of Rocky Mountain Steel Mills, Inc. located in Pueblo, Colorado – dealing with the manufacture of steel in mini-mills including methods of air pollution control and BACT in steel mini-mills and opacity issues at this steel mini-mill.

176. Trial Testimony (February 2002) on behalf of Rocky Mountain Steel Mills, Inc. in Denver District Court.

177. Trial Testimony (February 2003) on behalf of the United States in the Ohio Edison NSR Cases, *United States, et al. v. Ohio Edison Co., et al.*, C2-99-1181 (Southern District of Ohio).

178. Trial Testimony (June 2003) on behalf of the United States in the Illinois Power NSR Case, *United States v. Illinois Power Co., et al.*, 99-833-MJR (Southern District of Illinois).

179. Deposition (10/20/2005) on behalf of the United States in connection with the Cinergy NSR Case. *United States, et* al. *v. Cinergy Corp., et al.*, IP 99-1693-C-M/S (Southern District of Indiana).

180. Oral Testimony (August 2006) on behalf of the Appalachian Center for the Economy and the Environment re. the Western Greenbrier plant, WV before the West Virginia DEP.

181. Oral Testimony (May 2007) on behalf of various Montana petitioners (Citizens Awareness Network (CAN), Women's Voices for the Earth (WVE) and the Clark Fork Coalition (CFC)) re. the Thompson River Cogeneration plant before the Montana Board of Environmental Review.

182. Oral Testimony (October 2007) on behalf of the Sierra Club re. the Sevier Power Plant before the Utah Air Quality Board.

183. Oral Testimony (August 2008) on behalf of the Sierra Club and Clean Water re. Big Stone Unit II before the South Dakota Board of Minerals and the Environment.

184. Oral Testimony (February 2009) on behalf of the Sierra Club and the Southern Environmental Law Center re. Santee Cooper Pee Dee units before the South Carolina Board of Health and Environmental Control.

185. Oral Testimony (February 2009) on behalf of the Sierra Club and the Environmental Integrity Project re. NRG Limestone Unit 3 before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

186. Deposition (July 2009) on behalf of MTD Products, Inc., in the matter of *Alice Holmes and Vernon Holmes v. Home Depot USA, Inc., et al*.

187. Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Coleto Creek coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

188. Deposition (October 2009) on behalf of Environmental Defense, in the matter of permit challenges to the proposed Las Brisas coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

189. Deposition (October 2009) on behalf of the Sierra Club, in the matter of challenges to the proposed Medicine Bow Fuel and Power IGL plant in Cheyenne, Wyoming.

190. Deposition (October 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed Tenaska coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH). (April 2010).

191. Oral Testimony (November 2009) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

192. Deposition (December 2009) on behalf of Environmental Defense and others, in the matter of challenges to the proposed White Stallion Energy Center coal fired power plant project at the Texas State Office of Administrative Hearings (SOAH).

193. Oral Testimony (February 2010) on behalf of the Environmental Defense Fund re. the White Stallion Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

194. Deposition (June 2010) on behalf of the United States in connection with the Alabama Power Company NSR Case. *United States v. Alabama Power Company*, CV-01-HS-152-S (Northern District of Alabama, Southern Division).

195. Trial Testimony (September 2010) on behalf of Commonwealth of Pennsylvania – Dept. of Environmental Protection, State of Connecticut, State of New York, State of Maryland, and State of New Jersey (Plaintiffs) in connection with the Allegheny Energy NSR Case in US District Court in the Western District of Pennsylvania. *Plaintiffs v. Allegheny Energy Inc., et al.,* 2:05cv0885 (Western District of Pennsylvania).

196. Oral Direct and Rebuttal Testimony (September 2010) on behalf of Fall-Line Alliance for a Clean Environment and others in the matter of the PSD Air Permit for Plant Washington issued by Georgia DNR at the Office of State Administrative Hearing, State of Georgia (OSAH-BNR-AQ-1031707-98-WALKER).

197. Oral Testimony (September 2010) on behalf of the State of New Mexico Environment Department in the matter of Proposed Regulation 20.2.350 NMAC – *Greenhouse Gas Cap and Trade Provisions,* No. EIB 10-04 (R), to the State of New Mexico, Environmental Improvement Board.

198. Oral Testimony (October 2010) on behalf of the Environmental Defense Fund re. the Las Brisas Energy Center before the Texas State Office of Administrative Hearings (SOAH) Administrative Law Judges.

199. Oral Testimony (November 2010) regarding BART for PSCo Hayden, CSU Martin Drake units before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

200. Oral Testimony (December 2010) regarding BART for TriState Craig Units, CSU Nixon Unit, and PRPA Rawhide Unit) before the Colorado Air Quality Commission on behalf of the Coalition of Environmental Organizations.

201. Deposition (December 2010) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

202. Deposition (February 2011 and January 2012) on behalf of Wild Earth Guardians in the matter of opacity exceedances and monitor downtime at the Public Service Company of Colorado (Xcel)'s Cherokee power plant. No. 09-cv-1862 (D. Colo.).

203. Oral Testimony (February 2011) to the Georgia Office of State Administrative Hearings (OSAH) in the matter of Minor Source HAPs status for the proposed Longleaf Energy Associates power plant (OSAH-BNR-AQ-1115157-60-HOWELLS) on behalf of the Friends of the Chattahoochee and the Sierra Club).

204. Deposition (August 2011) on behalf of the United States in *United States of America v. Cemex, Inc.*, Civil Action No. 09-cv-00019-MSK-MEH (District of Colorado).

205. Deposition (July 2011) and Oral Testimony at Hearing (February 2012) on behalf of the Plaintiffs MYTAPN in the matter of Microsoft-Yes, Toxic Air Pollution-No (MYTAPN) v. State of Washington, Department of Ecology and Microsoft Corporation Columbia Data Center to the Pollution Control Hearings Board, State of Washington, Matter No. PCHB No. 10-162.

206. Oral Testimony at Hearing (March 2012) on behalf of the United States in connection with the Louisiana Generating NSR Case. *United States v. Louisiana Generating, LLC*, 09-CV100-RET-CN (Middle District of Louisiana).

207. Oral Testimony at Hearing (April 2012) on behalf of the New Hampshire Sierra Club at the State of New Hampshire Public Utilities Commission, Docket No. 10-261 – the 2010 Least Cost

Integrated Resource Plan (LCIRP) submitted by the Public Service Company of New Hampshire (re. Merrimack Station Units 1 and 2).

208. Oral Testimony at Hearing (November 2012) on behalf of Clean Wisconsin in the matter of Application of Wisconsin Public Service Corporation for Authority to Construct and Place in Operation a New Multi-Pollutant Control Technology System (ReACT) for Unit 3 of the Weston Generating Station, before the Public Service Commission of Wisconsin, Docket No. 6690-CE-197.

209. Deposition (March 2013) in the matter of various Environmental Petitioners v. North Carolina DENR/DAQ and Carolinas Cement Company, before the Office of Administrative Hearings, State of North Carolina.

210. Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

211. Deposition (August 2013) on behalf of the Sierra Club in connection with the Luminant Martin Lake Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 5:10-cv-0156-MHS-CMC (Eastern District of Texas, Texarkana Division).

212. Deposition (February 2014) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

213. Trial Testimony (February 2014) in the matter of *Environment Texas Citizen Lobby, Inc and Sierra Club v. ExxonMobil Corporation et al.*, Civil Action No. 4:10-cv-4969 (Southern District of Texas, Houston Division).

214. Trial Testimony (February 2014) on behalf of the Sierra Club in connection with the Luminant Big Brown Case. *Sierra Club v. Energy Future Holdings Corporation and Luminant Generation Company LLC*, Civil Action No. 6:12-cv-00108-WSS (Western District of Texas, Waco Division).

215. Deposition (June 2014) and Trial (August 2014) on behalf of ECM Biofilms in the matter of the *US Federal Trade Commission (FTC) v. ECM Biofilms* (FTC Docket #9358).

216. Deposition (February 2015) on behalf of Plaintiffs in the matter of *Sierra Club and Montana Environmental Information Center (Plaintiffs) v. PPL Montana LLC, Avista Corporation, Puget Sound Energy, Portland General Electric Company, Northwestern Corporation, and Pacificorp (Defendants)*, Civil Action No. CV 13-32-BLG-DLC-JCL (US District Court for the District of Montana, Billings Division).

217. Oral Testimony at Hearing (April 2015) on behalf of Niagara County, the Town of Lewiston, and the Villages of Lewiston and Youngstown in the matter of CWM Chemical Services, LLC New York State Department of Environmental Conservation (NYSDEC) Permit Application Nos.: 9-2934-00022/00225, 9-2934-00022/00231, 9-2934-00022/00232, and 9-2934-00022/00249 (pending).

218. Deposition (August 2015) on behalf of Plaintiff in the matter of *Conservation Law Foundation (Plaintiff) v. Broadrock Gas Services LLC, Rhode Island LFG GENCO LLC, and Rhode Island Resource Recovery Corporation (Defendants)*, Civil Action No. 1:13-cv-00777-M-PAS (US District Court for the District of Rhode Island).

219. Testimony at Hearing (August 2015) on behalf of the Sierra Club in the matter of *Amendments to 35 Illinois Administrative Code Parts 214, 217, and 225* before the Illinois Pollution Control Board, R15-21.

220. Deposition (May 2015) on behalf of Plaintiffs in the matter of *Northwest Environmental Defense Center et. al., (Plaintiffs) v. Cascade Kelly Holdings LLC, d/b/a Columbia Pacific Bio-Refinery, and Global Partners LP (Defendants)*, Civil Action No. 3:14-cv-01059-SI (US District Court for the District of Oregon, Portland Division).

221. Trial Testimony (October 2015) on behalf of Plaintiffs in the matter of *Northwest Environmental Defense Center et. al., (Plaintiffs) v. Cascade Kelly Holdings LLC, d/b/a Columbia Pacific Bio-Refinery, and Global Partners LP (Defendants)*, Civil Action No. 3:14-cv-01059-SI (US District Court for the District of Oregon, Portland Division).

222. Deposition (April 2016) on behalf of the Plaintiffs in *UNatural Resources Defense Council, Respiratory Health Association, and Sierra Club (Plaintiffs) v. Illinois Power Resources LLC and Illinois Power Resources Generation LLC (Defendants)*, Civil Action No. 1:13-cv-01181 (Central District of Illinois, Peoria Division).

223. Trial Testimony at Hearing (July 2016) in the matter of Tesoro Savage LLC Vancouver Energy Distribution Terminal, Case No. 15-001 before the State of Washington Energy Facility Site Evaluation Council.

224. Trial Testimony (December 2016) on behalf of the challengers in the matter of the Delaware Riverkeeper Network, Clean Air Council, et. al., vs. Commonwealth of Pennsylvania Department of Environmental Protection and R. E. Gas Development LLC regarding the Geyer well site before the Pennsylvania Environmental Hearing Board.

225. Trial Testimony (July-August 2016) on behalf of the United States in *United States of America v. Ameren Missouri*, Civil Action No. 4:11-cv-00077-RWS (Eastern District of Missouri, Eastern Division).

226. Trial Testimony (January 2017) on the Environmental Impacts Analysis associated with the Huntley and Huntley Poseidon Well Pad Hearing on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.

227. Trial Testimony (January 2017) on the Environmental Impacts Analysis associated with the Apex energy Backus Well Pad Hearing on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.

228. Trial Testimony (January 2017) on the Environmental Impacts Analysis associated with the Apex energy Drakulic Well Pad Hearing on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.

229. Trial Testimony (January 2017) on the Environmental Impacts Analysis associated with the Apex energy Deutsch Well Pad Hearing on behalf citizens in the matter of the special exception use Zoning Hearing Board of Penn Township, Westmoreland County, Pennsylvania.

230. Deposition Testimony (July 2017) on behalf of Plaintiffs in the matter of *Casey Voight and Julie Voight v Coyote Creek Mining Company LLC (Defendant)* Civil Action No. 1:15-CV-00109 (US District Court for the District of North Dakota, Western Division).

231. Deposition Testimony (November 2017) on behalf of Defendant in the matter of *Oakland Bulk and Oversized Terminal (Plaintiff) v City of Oakland (Defendant,)* Civil Action No. 3:16-cv-07014-VC (US District Court for the Northern District of California, San Francisco Division).

232. Deposition Testimony (December 2017) on behalf of Plaintiff in the matter of *Wildearth Guardians (Plaintiff) v Colorado Springs Utility Board (Defendant)* Civil Action No. 1:15-cv-00357-CMA-CBS (US District Court for the District of Colorado).

233. Deposition Testimony (January 2018) in the matter of National Parks Conservation Association (NPCA) v. State of Washington Department of Ecology and British Petroleum (BP) before the Washington Pollution Control Hearing Board, Case No. 17-055.

234. Trial Testimony (January 2018) on behalf of Defendant in the matter of *Oakland Bulk and Oversized Terminal (Plaintiff) v City of Oakland (Defendant,)* Civil Action No. 3:16-cv-07014-VC (US District Court for the Northern District of California, San Francisco Division).

235. Trial Testimony (April 2018) on behalf of the National Parks Conservation Association (NPCA) in the matter of NPCA v State of Washington, Department of Ecology and BP West Coast Products, LLC, PCHB No. 17-055 (Pollution Control Hearings Board for the State of Washington.

236. Deposition (June 2018) (harm Phase) on behalf of Plaintiffs in the matter of *Natural Resources Defense Council, Inc., Sierra Club, Inc., and Respiratory Health Association v. Illinois Power Resources LLC, and Illinois Power Resources Generating LLC (Defendants)*, Civil Action No. 1:13-cv-01181 (US District Court for the Central District of Illinois, Peoria Division).

237. Trial Testimony (July 2018) on behalf of Petitioners in the matter of *Coosa River Basin Initiative and Sierra Club (Petitioners) v State of Georgia Environmental Protection Division, Georgia Department of Natural Resources (Respondent) and Georgia Power Company (Intervenor/Respondent)*, Docket Nos: 1825406-BNR-WW-57-Howells and 1826761-BNR-WW-57-Howells, Office of State Administrative Hearings, State of Georgia.

238. Deposition (January 2019) and Trial Testimony (January 2019) on behalf of Sierra Club and Texas Campaign for the Environment (Appellants) in the contested case hearing before the Texas State Office of Administrative Hearings in Docket Nos. 582-18-4846, 582-18-4847 (Application of GCGV Asset Holding, LLC for Air Quality Permit Nos. 146425/PSDTX1518 and 146459/PSDTX1520 in San Patricio County, Texas).

239. Deposition (February 2019) and Trial Testimony (March 2019) on behalf of Sierra Club in the State of Florida, Division of Administrative Hearings, Case No. 18-2124EPP, Tampa Electric Company Big Bend Unit 1 Modernization Project Power Plant Siting Application No. PA79-12-A2.

240. Deposition (June 2019) relating to the appeal of air permits issued to PTTGCA on behalf of Appellants in the matter of *Sierra Club (Appellants) v. Craig Butler, Director, et. al., Ohio EPA (Appellees)* before the State of Ohio Environmental Review Appeals Commission (ERAC), Case Nos. ERAC-19-6988 through -6991.

241. Deposition (September 2019) on behalf of Appellants relating to the NPDES permit for the Cheswick power plant in the matter of *Three Rivers Waterkeeper and Sierra Club (Appellants) v. State of Pennsylvania Department of Environmental Protection (Appellee) and NRG Power Midwest (Permittee)*, before the Commonwealth of Pennsylvania Environmental Hearing Board, EHB Docket No. 2018-088-R.

242. Deposition (December 2019) on behalf of the Plaintiffs in the matter of David Kovac, individually and on behalf of wrongful death class of Irene Kovac v. BP Corporation North America Inc., Circuit Court of Jackson County, Missouri (Independence), Case No. 1816-CV12417.

243. Deposition (February 2020, virtual) and testimony at Hearing (August 2020, virtual) on behalf of Earthjustice in the matter of *Objection to the Issuance of PSD/NSR and Title V permits for Riverview Energy Corporation*, Dale, Indiana, before the Indiana Office of Environmental Adjudication, Cause No. 19-A-J-5073.

244. Hearing (July 14-15, 2020, virtual) on behalf of the Sierra Club in the matter of *the Application of the Ohio State University for a certificate of Environmental Compatibility and Public Need to Construct a Combined Heat and Power Facility in Franklin County, Ohio*, before the Ohio Power Siting Board, Case No. 19-1641-EL-BGN.

245. Hearing (September 2020, virtual) on behalf of WildEarth Guardians (petitioners) in the matter of *the Appeals of the Air Quality Permit No. 7482-M1 Issued to 3 Bear Delaware* Operating – *NM LLC (EIB No. 20-21(A) and Registrations Nos. 8729, 8730, and 8733 under General Construction Permit for Oil and Gas Facilities (EIB No. 20-33 (A)*, before the State of New Mexico, Environmental Improvement Board.

246. Deposition (December 2020, March 4-5, 2021, all virtual) and Hearing (April 2021, virtual) in support of Petitioner's Motion for Stay of PSCAA NOC Order of Approval No. 11386 in the matter of the *Puyallup Tribe of Indians v. Puget Sound Clean Air Agency (PSCAA) and Puget Sound Energy (PSE),* before the State of Washington Pollution Control Hearings Board, PCHB No. P19-088.

247. Hearing (September 2020, virtual) on the *Initial Economic Impact Analysis (EIA) for A Proposal To* Regulate *NOx Emissions from Natural Gas Fired Rich-Burn Natural Gas Reciprocating*

Internal Combustion Engines (RICE) Greater Than 100 Horsepower prepared on behalf of Earthjustice and the National Parks Conservation Association in the matter of Regulation Number 7, Alternate Rules before the Colorado Air Quality Control Commission.

248. Deposition (December 2020, virtual and Hearing February 2021, virtual) on behalf of the Plaintiffs (Shrimpers and Fishermen of the Rio Grande Valley represented by Texas RioGrande Legal Aid, Inc.) in the matter of the Appeal of Texas Commission on Environmental Quality (TCEQ) Permit Nos. 147681, PSDTX1522, GHGPSDTX172 for the Jupiter Brownsville Heavy Condensate Upgrader Facility, Cameron County, before the Texas State Office of Administrative Hearings, SOAH Docket No. 582-21-0111, TCEQ Docket No. 2020-1080-AIR.

249. Deposition (January 2021, virtual) on behalf of Plaintiffs in the matter of *PennEnvironment Inc., and Clean Air Council (Plaintiffs) and Allegheny County Health Department (Plaintiff-Intervenor) v. United States Steel Corporation (Defendant)*, Civil Action No. 2-19-cv-00484-MJH (US District Court for the Western District of Pennsylvania.)

250. Deposition (February 2021, virtual) on behalf of Plaintiffs in the matter of *Sierra Club Inc. (Plaintiff) v. GenOn Power Midwest LP (*Defendants*)*, Civil Action No. 2-19-cv-01284-WSS (US District Court for the Western District of Pennsylvania.)

251. Deposition (April 2021, virtual) on the Potential Remedies to Avoid Adverse Thermal Impacts from the Merrimack Station on behalf of Plaintiffs in the matter of *Sierra Club Inc. and the* Conservation *Law Foundation (Plaintiffs) v. Granite Shore Power, LLC et. al., (Defendants)*, Civil Action No. 19-cv-216-JL (US District Court for the District of New Hampshire.)

252. Deposition (June 2021, virtual) on behalf of Plaintiffs in the matter of *Sierra Club (Plaintiff) v. Woodville Pellets, LLC (Defendant)*, Civil Action No. 9:20-cv-00178-MJT (US District Court for the Eastern District of Texas, Lufkin Division).

253. Deposition (June 2021, virtual) on behalf of the Plaintiffs in the matter of *Modern Holdings, LLC, et al. (Plaintiffs) v. Corning Inc., et al. (Defendants)*, Civil Action No. 5:13-cv-00405-GFVT, (US District Court for the Eastern District of Kentucky, Central Division at Lexington).

254. Testimony (June 2021, virtual) regarding the Aries Newark LLC Sludge Processing Facility, Application No. CPB 20-74, (Central Planning Board, City of Newark, New Jersey).

255. Testimony at Hearing (October 2021) on behalf of Evraz Rocky Mountain Steel in the matter of Colorado's Proposed Revisions to Regulation 22, the Greenhouse Gas Emissions and Energy Management for the Manufacturing Sector in Colorado (GEMM Rule), before the Colorado Air Quality Control Commission.

256. Deposition (November 2021) for *Charles Johnson Jr. (Plaintiff) v. BP Exploration and Production Inc., et. al. (Defendant),* Civil Action No. 2:20-CV-01329 (Related to 12-968 BELO in MDL No. 2179). (US District Court for the Eastern District of Louisiana).

257. Testimony at Hearing (November 2021) on behalf of *National Parks Conservation Association, et. al.*, in the matter of the Proposed Revisions to Colorado's Regional Haze State Implementation Plan (SIP) and Colorado Regulation 23, before the Colorado Air Quality Control Commission.

258. Deposition (December 2021) on behalf of Plaintiffs in Re: Deepwater Horizon BELO Cases, Case No. 3:19cv963-MCR-GRJ (US District Court for the Northern District of Florida, Pensacola Division).

259. Deposition (December 2021) for *James Noel (Plaintiff) v. BP Exploration and Production Inc., et. al. (Defendant),* Civil Action No. 1:19-CV-00694-JB-MU-C (US District Court for the Southern District of Alabama, Southern Division).

260. Testimony at Hearing (February 2022, virtual) in the matter of the *Appeal Petition for Hearing on Air Quality Permit No. 8585 on behalf of Earth Care New Mexico et. al., (Petitioners) v. New Mexico Environment Department and Associated Asphalt and Materials, LLC (Applicant),* No. EIB 21-48 before the State of New Mexico Environmental Improvement Board.

261. Deposition (March 2022) and Rebuttal Deposition (July 2022) for *Kamuda (Plaintiff) v. Sterigenics U.S., LLC, et. al., (Defendant)*, Case No. 2018-L-010475 (Circuit Court of Cook County, Illinois.)

262. Deposition (April 2022, virtual) in the matter of Application of TPC Group LLC for New State and PSD Air Quality Permits (various), TCEQ Docket No. 2021-1422-AIR, SOAH Docket No. 582-22-0799, Before the Texas State Office of Administrative Hearings.

263. Deposition (May 2022, virtual) in the matter of the *Water Works and Sewer Board of the City of Gadsden (Plaintiff) v. 3M Company, et. al., (*Defendants*)*, Civil Action No.: 31 CV-2016-900676.00 (Circuit County of Etowah County, Alabama)

264. Deposition (June 2022 and September 2022, both virtual) for *Teresa* Fornek *(Plaintiff) v. Sterigenics U.S., LLC, et. al., (Defendant)*, Case No. 2018-L-010744 (Circuit Court of Cook County, Illinois.)

265. Deposition (June 2022, virtual) on behalf of the Plaintiffs in the matter of Toll Brothers, Inc., and Porter Ranch Development Company (Plaintiffs) v. Sempra Energy, Southern California Gas Company et. al., (Defendants), Southern California [Aliso Canyon] Gas Leak Cases, JCCP No.: 4861, Lead Case No.: BC674622, Superior Court of the State of California for the County of Los Angeles.

266. Deposition (July 2022) for *Richard Dufour (Plaintiff) v. BP Exploration and Production Inc., et. al. (Defendant)*, Civil Action No. 19-cv-00591 (US District Court for the Southern District of Mississippi).

267. Trial (August 2022) on behalf of the Plaintiffs in the matter of Modern *Holdings, LLC, et al. (Plaintiffs) v. Phillips (Defendants)*, Civil Action No. 5:13-cv-00405-GFVT, (US District Court for the Eastern District of Kentucky, Central Division at Lexington).

268. Trial (August 2022, in person) for *Susan Kamuda (Plaintiff) v. Sterigenics U.S., LLC, et. al., (Defendant)*, Case No. 2018-L-010475 (Circuit Court of Cook County, Illinois).

269. Deposition (September 2022, virtual) for *Heather Schumacher (Plaintiff) v. Sterigenics U.S., LLC, et. al., (Defendant)*, Case No. 2018-L-010744 (Circuit Court of Cook County, Illinois.)

270. Deposition (September 2022) on behalf of Plaintiffs in *Phylliss Grayson et. al. (Plaintiffs), v Lockheed Martin Corporation (Defendant)*, Case No. 6:20-cv-01770. (US District Court for the Middle District of Florida – Orlando Division.)

271. Hearing (October 2022) on behalf of the Puyallup Tribe of Indians in the matter of *Washington Utilities and Transportation Commission (Complainant) v. Puget Sound Energy (Respondent)* before the Washington Utilities and Transportation Commission, Docket UE-220066 and UG-220067 (Consolidated).

272. Deposition (September 2022) for *Teresa Fornek (Plaintiff) v. Sterigenics U.S., LLC, et. al., (Defendant)*, Case No. 2018-L-010475 (Circuit Court of Cook County, Illinois).

273. Trial (October 2022, in person) for *Teresa Fornek (Plaintiff) v. Sterigenics U.S., LLC, et. al., (Defendant)*, Case No. 2018-L-010475 (Circuit Court of Cook County, Illinois).

ATTACHMENT 3

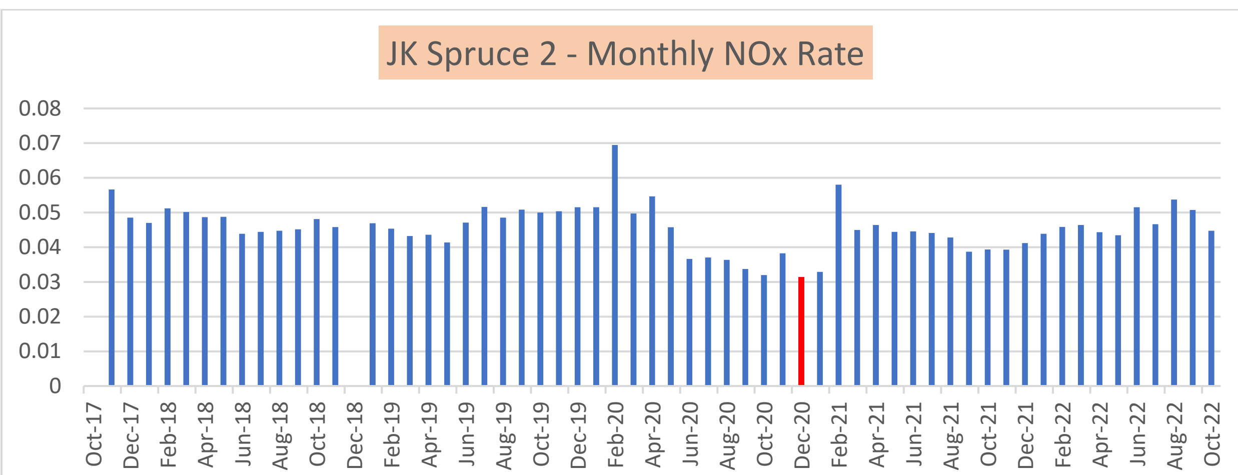
SIERRA CLUB

NOx Emission Rates at Selected Coal Fired Electricity Generating Units with SCR

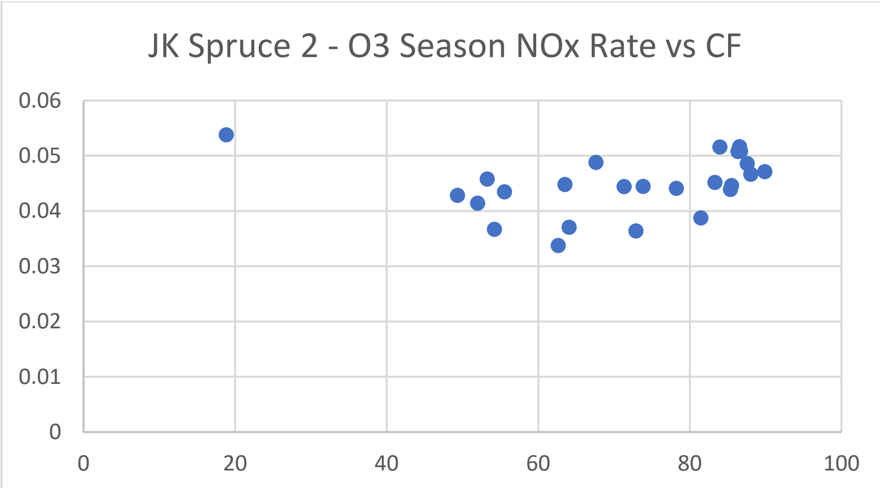
Texas

JK Spruce Unit 2: Unit 2 (878 MW) at the JK Spruce plant was analyzed. This unit has SCR installed. It can reliably achieve NOx emission rates of below 0.04 lb/MMBtu. This unit is not operating its SCR consistently in accordance with its lowest demonstrated NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
JK Spruce	2	878	0.0313	0.0695	0.0537

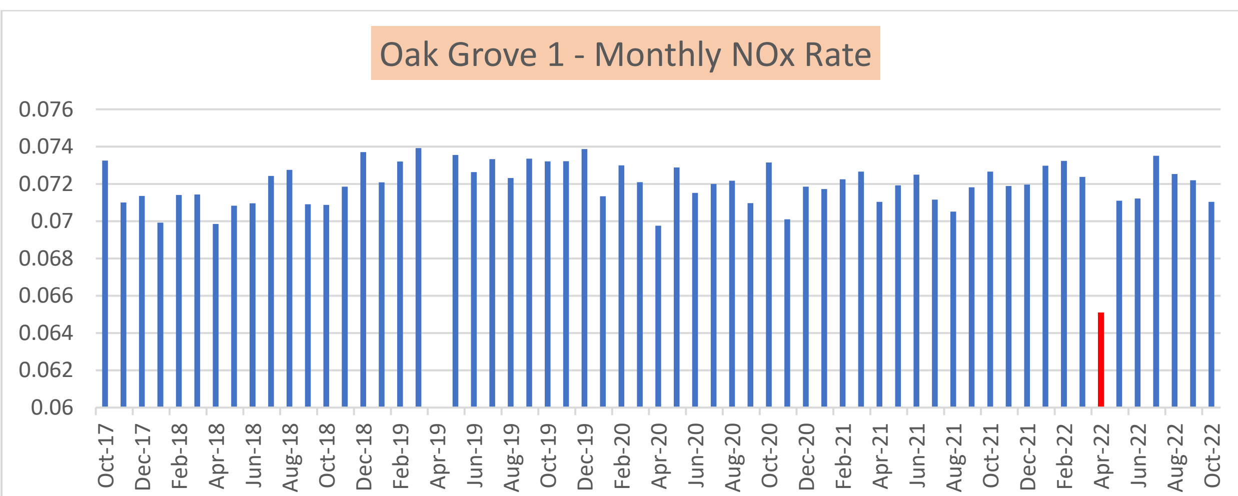


The chart above confirms that JK Spruce Unit 2 has achieved levels below 0.04 lb/MMBtu, with a low of 0.0313 lb/MMBtu, shown in red. The chart below shows that JK Spruce Unit 2 has achieved less than 0.04 lb/MMBtu over a range of ozone-season operating capacity factors.

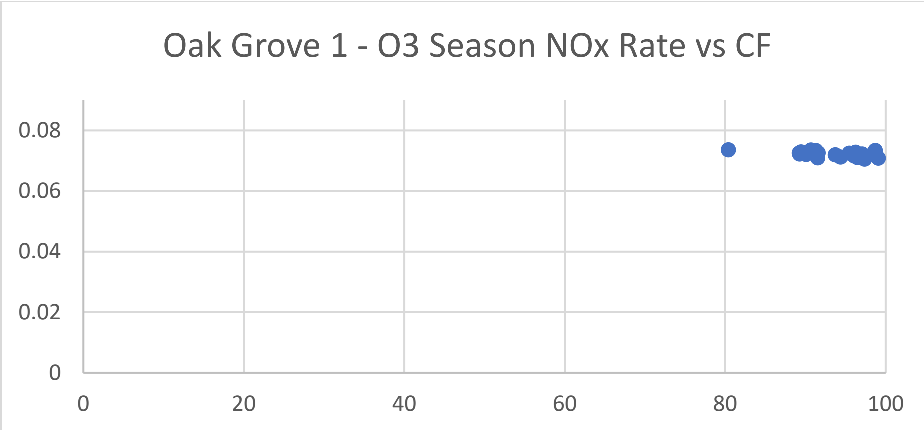


Oak Grove 1: Unit 1 (917 MW) at the Oak Grove plant was analyzed. This unit has SCR installed. It can achieve slightly lower NOx emission rates. It is not operating its SCR consistently according to the SCR's NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Oak Grove	1	917	0.0651	0.0739	0.0736
Oak Grove	2	879	0.0690	0.1117	0.0753

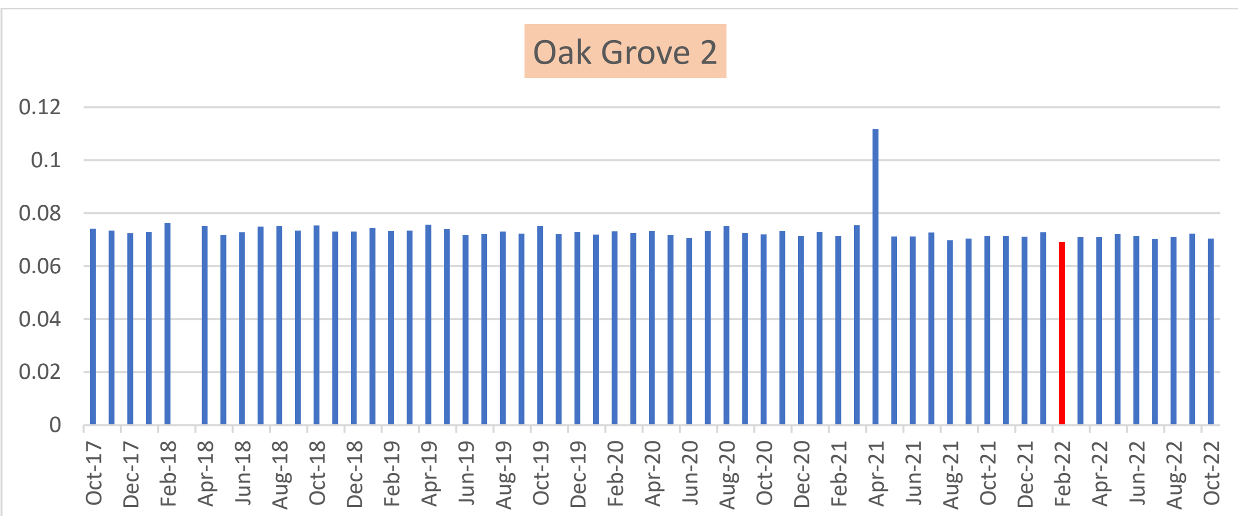


The chart above confirms that Oak Grove Unit 1 has achieved levels below 0.07 lb/MMBtu on several months of recent operation, with a low of 0.0651 lb/MMBtu, shown in red. The chart below shows that Oak Grove Unit 1 has achieved approximately 0.07 lb/MMBtu over a range of ozone-season operating capacity factors.

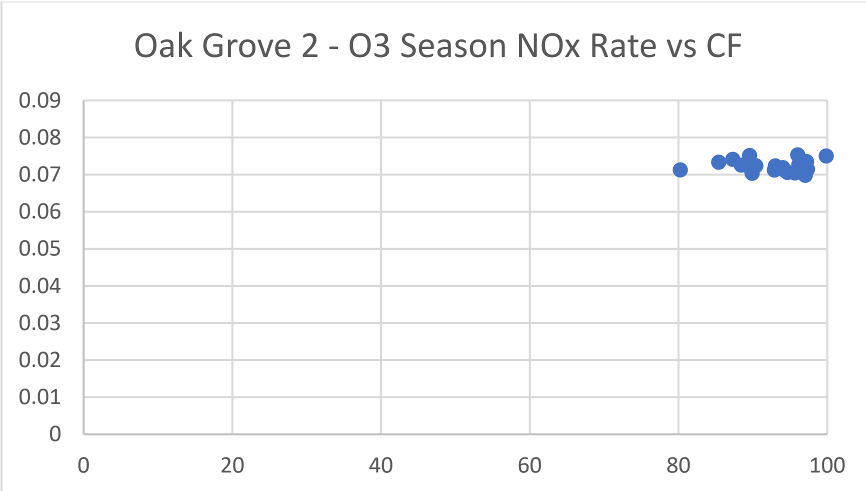


Oak Grove 2: Unit 2 (879 MW) at the Oak Grove plant was analyzed. This unit has SCR installed. It may be able to achieve slightly lower NOx emission rates.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Oak Grove	1	917	0.0651	0.0739	0.0736
Oak Grove	2	879	0.0690	0.1117	0.0753

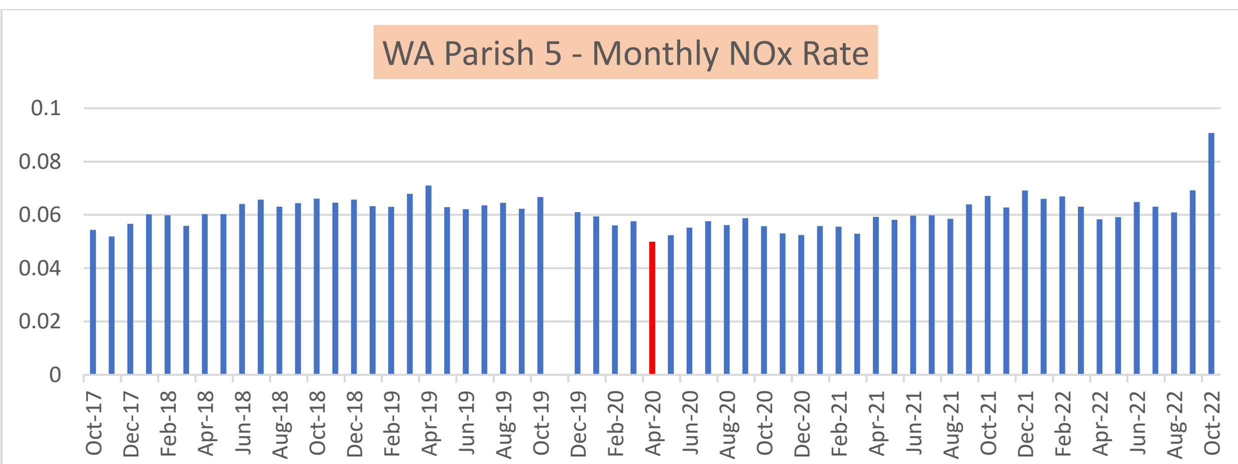


The chart above confirms that Oak Grove Unit 2 regularly achieves NOx emissions rates of approximately 0.07 lb/MMBtu, with a low of 0.0690 lb/MMBtu, shown in red.

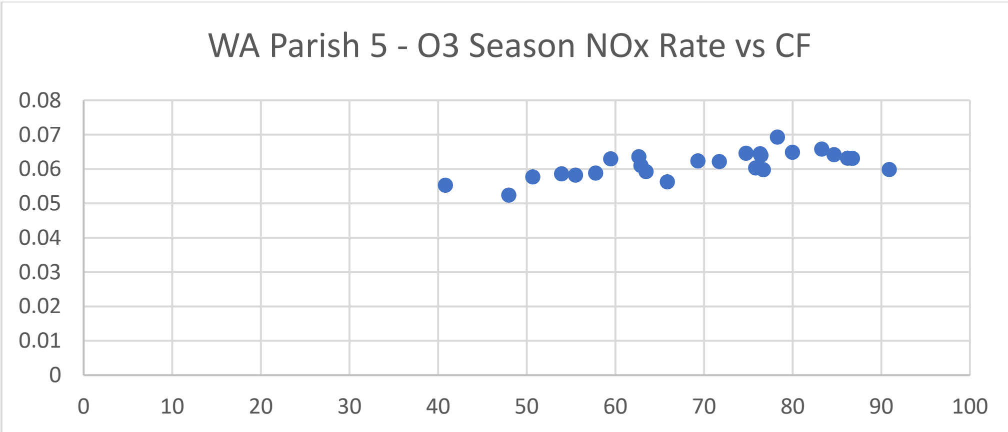


WA Parish Unit 5: Unit 5 (734 MW) at the WA Parish plant was analyzed. This unit has SCR installed. It can reliably achieve NOx emission rates below 0.06 lb/MMBtu. It is not operating its SCR consistently in accordance with the lowest demonstrated NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Parish	5	734	0.0499	0.0908	0.0692

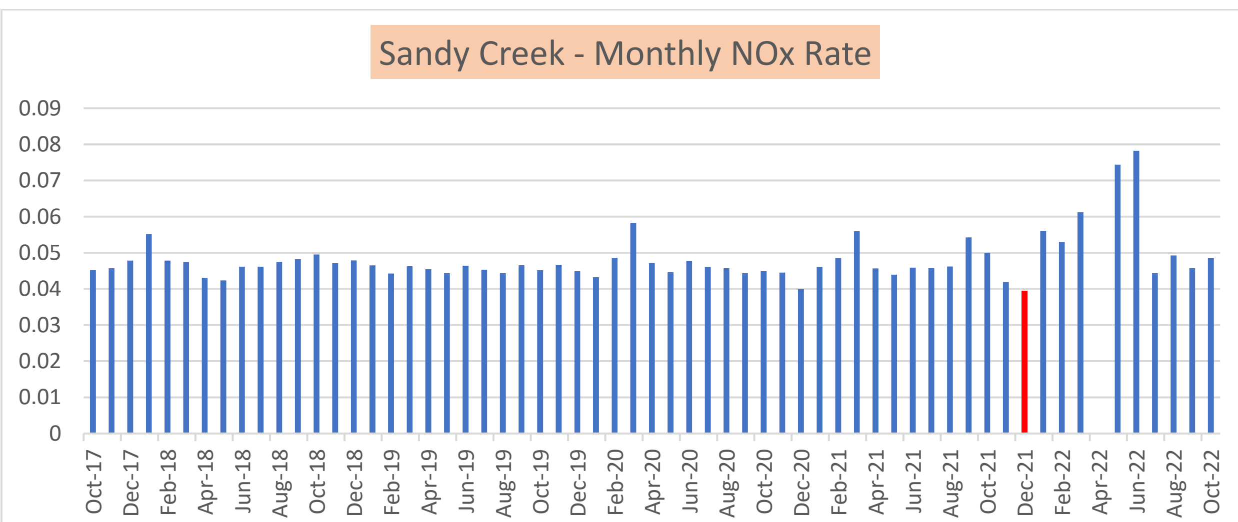


The chart above confirms that WA Parish Unit 5 has achieved levels below 0.06 lb/MMBtu on many months of recent operation, with a low of 0.0499 lb/MMBtu, shown in red. The chart below shows that WA Parish Unit 5 has achieved less than 0.06 lb/MMBtu over a wide range of ozone-season operating capacity factors.

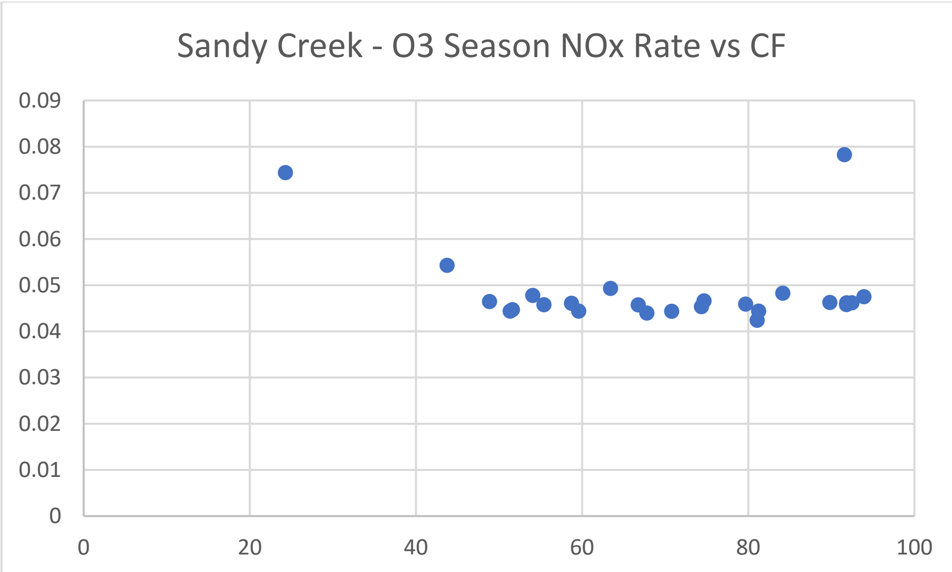


Sandy Creek Unit 1: Sandy Creek Unit 1 (1008 MW) was analyzed. This unit has SCR installed. It can reliably achieve NOx emission rates below 0.05 lb/MMBtu. It is not operating its SCR consistently in accordance with its lowest demonstrated NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Sandy Creek	1	1008	0.0395	0.0782	0.0782



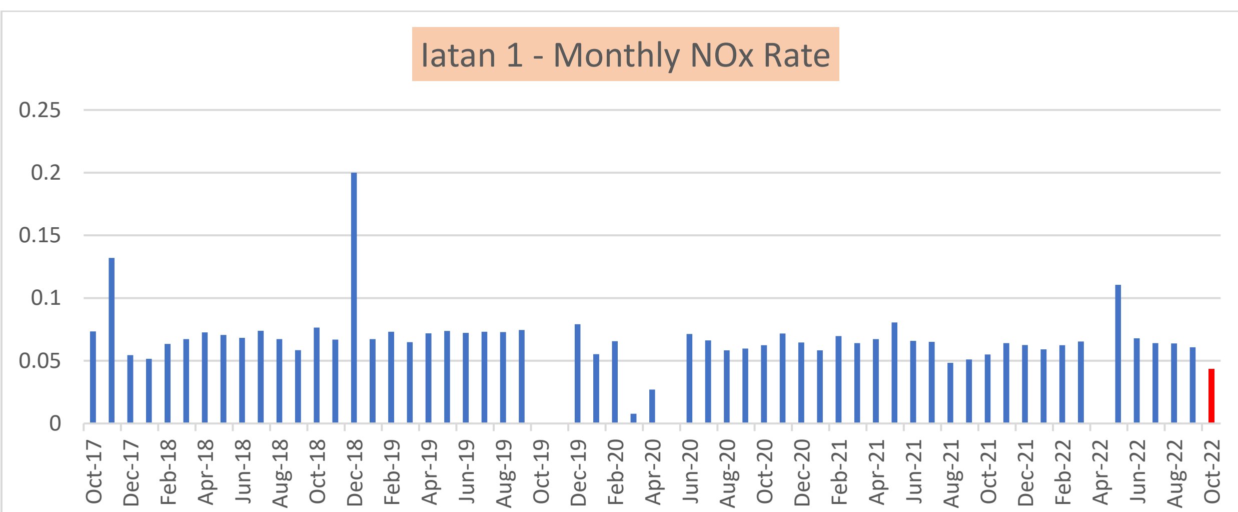
The chart above confirms that Sandy Creek 1 has achieved levels well below 0.05 lb/MMBtu on many months of recent operation, with a low of 0.0395 lb/MMBtu, shown in red. The chart below shows that Sandy Creek 1 has achieved less than 0.05 lb/MMBtu over a wide range of ozone-season operating capacity factors.



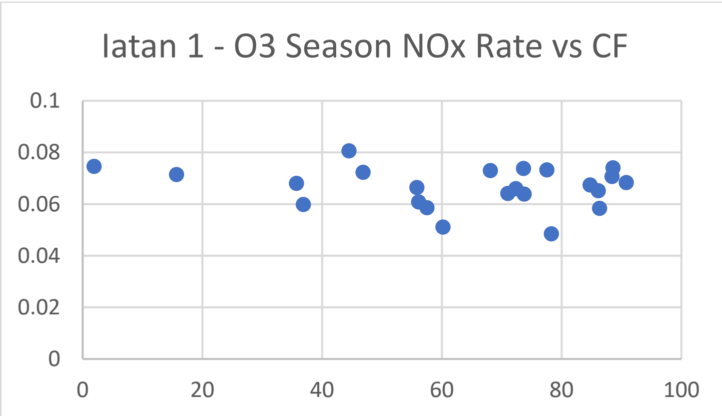
Missouri

Iatan 1: Unit 1 (726 MW) at the Iatan plant was analyzed. This unit has SCR installed. It can achieve reliably lower NOx emission rates below 0.06 lb/MMBtu. It is not operating its SCR consistently in accordance with the SCR's demonstrated NOx reduction capacity. It is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Iatan	1	726	0.0435	0.2000	0.0805
Iatan	2	914	0.0454	0.0595	0.0595

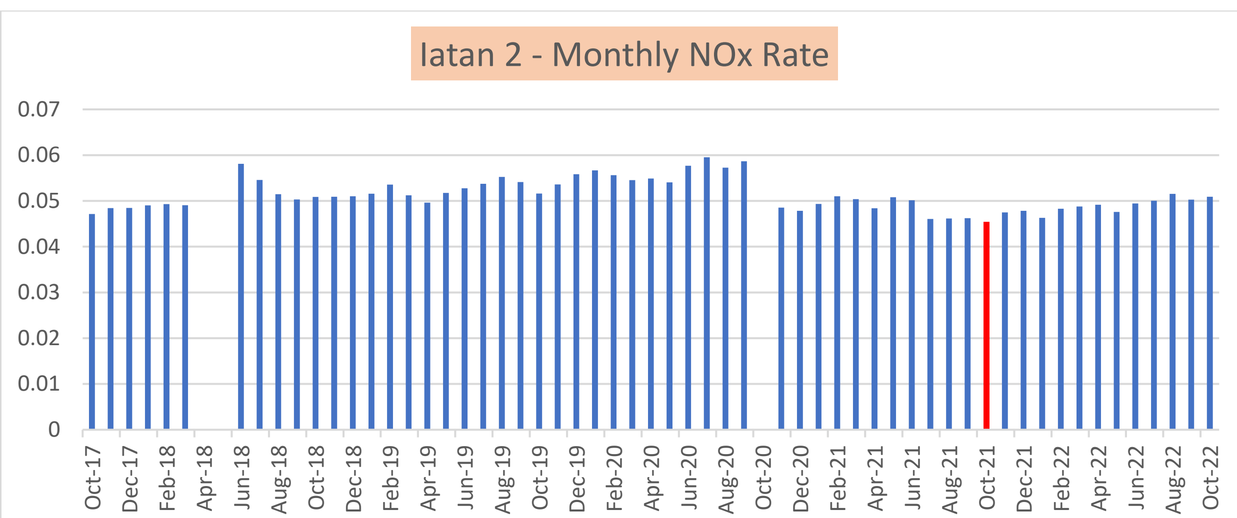


The chart above confirms that Iatan Unit 1 has achieved levels below 0.06 lb/MMBtu on several months of recent operation, with a low of .0435 lb/MMBtu, shown in red. The chart below shows that Iatan Unit 1 has achieved less than 0.06 lb/MMBtu over a wide range of ozone-season operating capacity factors.

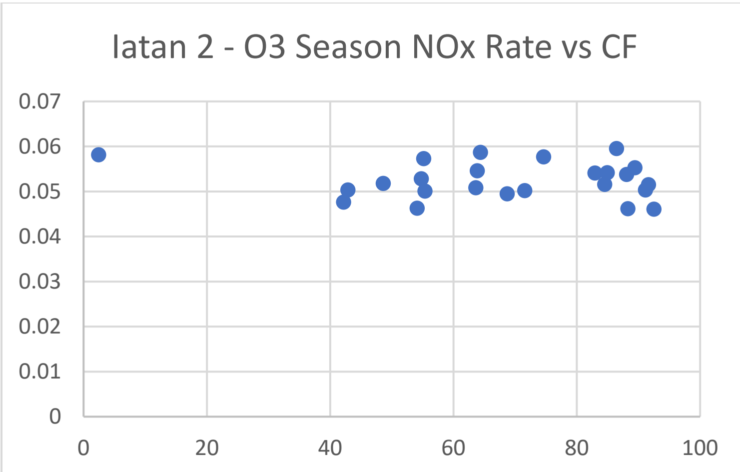


Iatan 2: Unit 2 (914 MW) at the Iatan plant was analyzed. This unit has SCR installed. It can reliably achieve NOx emission rates below 0.05 lb/MMBtu and has consistently done so from November 2020 through July 2022 excepting two months. It is not operating its SCR consistently in accordance with the SCR's lowest demonstrated NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Iatan	1	726	0.0435	0.2000	0.0805
Iatan	2	914	0.0454	0.0595	0.0595

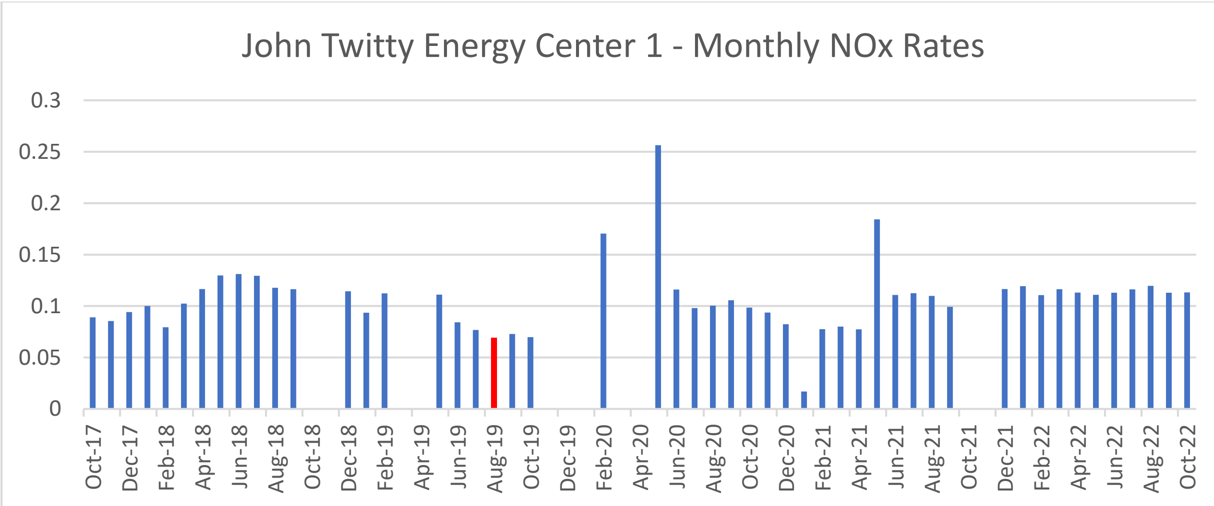


The chart above confirms that Iatan Unit 2 has achieved levels below 0.05 lb/MMBtu on many months of recent operation, with a low of 0.0454 lb/MMBtu, shown in red. The chart below shows that Iatan Unit 2 has achieved less than 0.05 lb/MMBtu over a wide range of ozone-season operating capacity factors.

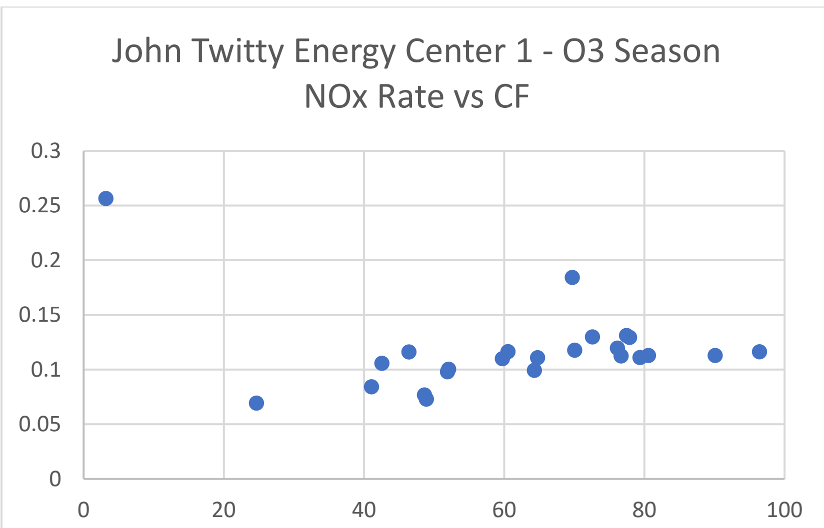


JTEC 1: Unit 1 (194 MW) at the John Twitty Energy Center plant was analyzed. This unit has SCR installed. It can reliably achieve NOx emission rates below 0.08 lb/MMBtu as demonstrated by its operation in 2019. It has wildly variable monthly NOx emission rates, ranging from above 0.25 lb/MMBtu at a high to 0.069 lb/MMBtu at a low. It is not operating its SCR consistently in accordance with its lowest demonstrated NOx reduction capacity. Indeed, it reliably emitted above 0.1 lb/MMBtu in late 2021 and 2022, significantly above its lowest demonstrated NOx reduction capacity achieved in 2019 of below 0.08 lb/MMBtu.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
John Twitty Energy Center	1	194	0.0693	0.2564	
John Twitty Energy Center	2	300	0.0637	0.0899	

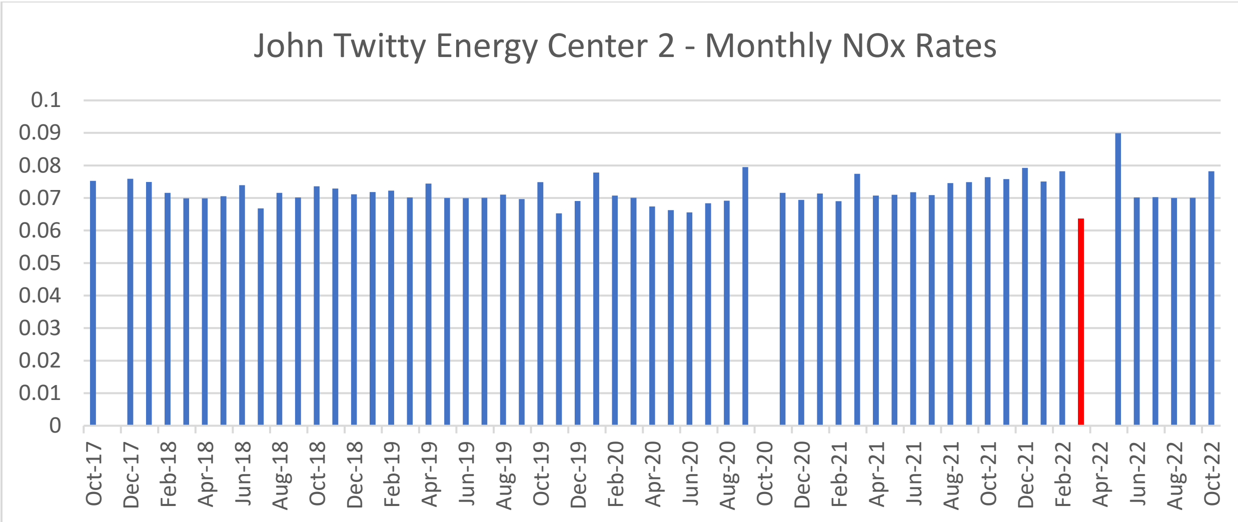


The chart above confirms that John Twitty Energy Center Unit 1 has consistently achieved levels below 0.08 lb/MMBtu on several months of recent operation, with a low of .0693 lb/MMBtu, shown in red. The chart below shows that John Twitty Energy Center Unit 1 has achieved less than 0.08 lb/MMBtu over a range of ozone-season operating capacity factors.

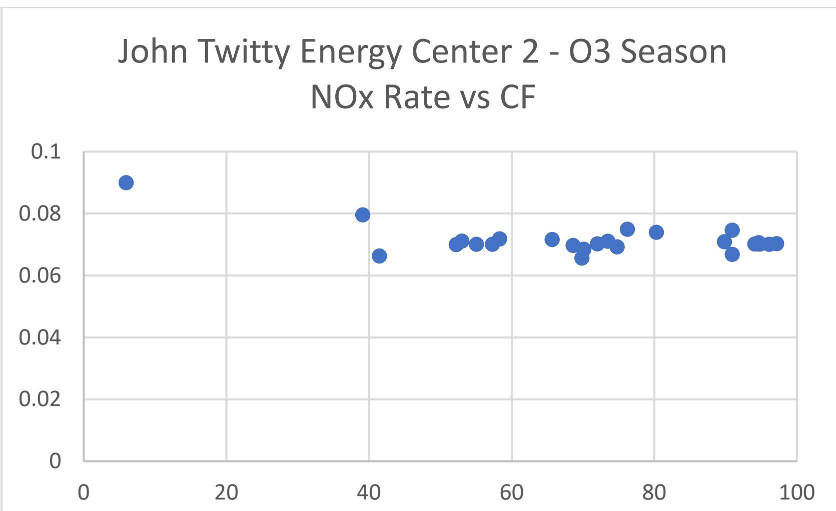


JTEC 2: Unit 2 (300 MW) at the John Twitty Energy Center plant was analyzed. This unit has SCR installed. It can reliably achieve NOx emissions rates at or below 0.07 lb/MMBtu. It is not operating consistent with its lowest demonstrated NOx reduction capacity.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
John Twitty Energy Center	1	194	0.0693	0.2564	
John Twitty Energy Center	2	300	0.0637	0.0899	

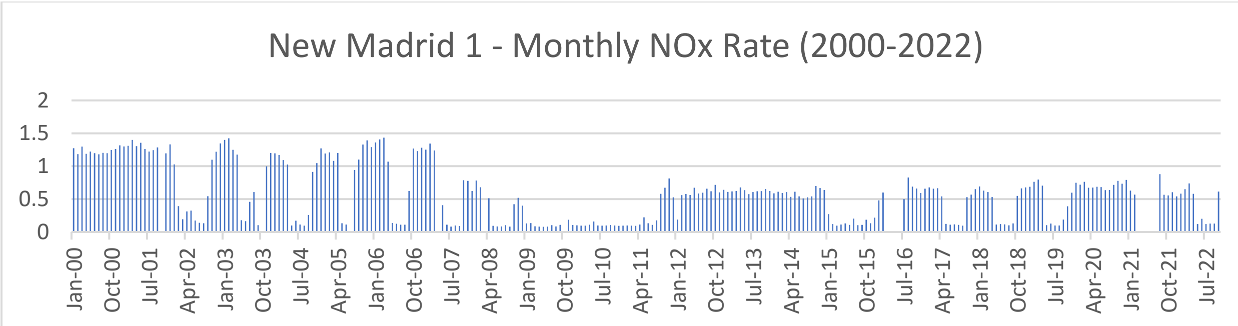


The chart above confirms that John Twitty Energy Center Unit 2 has achieved levels below 0.07 lb/MMBtu on several months of recent operation, with a low of .0637 lb/MMBtu, shown in red. The chart below shows that John Twitty Energy Center Unit 2 has achieved less than 0.07 lb/MMBtu over a range of ozone-season operating capacity factors.

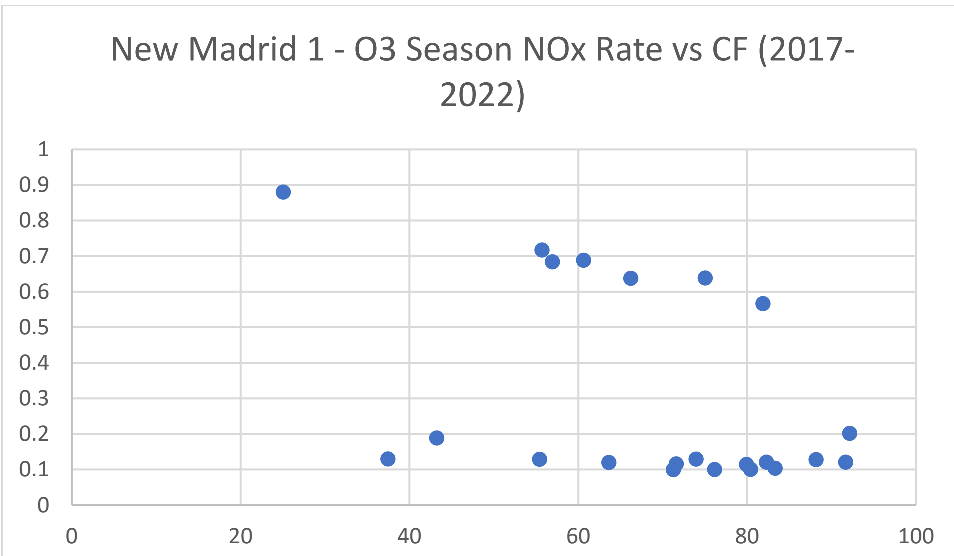


New Madrid 1: Unit 1 (600 MW) at the New Madrid plant was analyzed. This unit has SCR installed. Its NOx emissions rates are wildly variable. The unit can reliably achieve NOx emission rates below 0.10 lb/MMBtu. It is clearly not operating its SCR according to the SCR's NOx reduction capacity. During some ozone seasons, it is emitting at 0.87 lb/MMBtu, over 800% of its lowest demonstrated NOx reduction capacity. It is not because of low capacity factor nor MOT issues as the charts below demonstrate.

Plant	Unit	MW	NOx, Min	Nox, Min (Historical)*	NOx, Max	NOx, Max 03 Months
New Madrid	1	600	0.0991	0.08	0.8797	0.8797
New Madrid	2	600	0.1007	0.0764	1.0742	0.6420

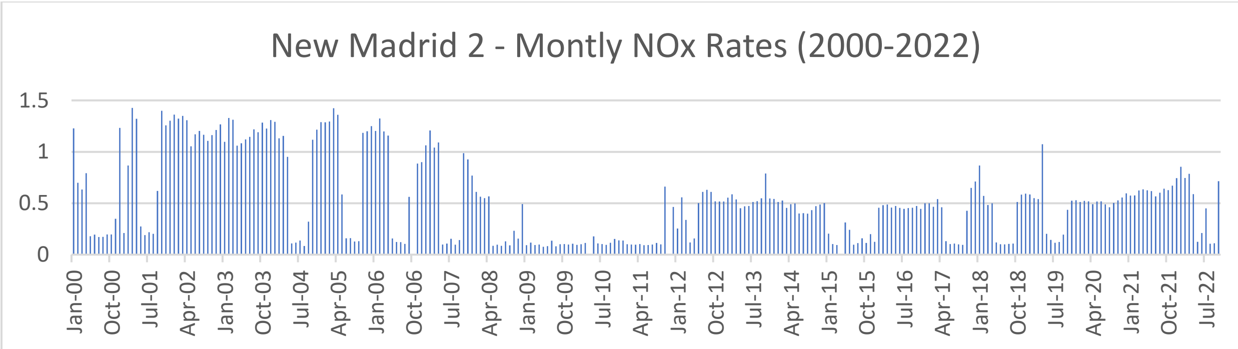


The chart above confirms that New Madrid 1 has reliably achieved levels below 0.10 lb/MMBtu, with a low of .0991 lb/MMBtu. The chart below shows that New Madrid Unit 1 has achieved levels less than approximately 0.10 lb/MMBtu over a range of ozone-season operating capacity factors.

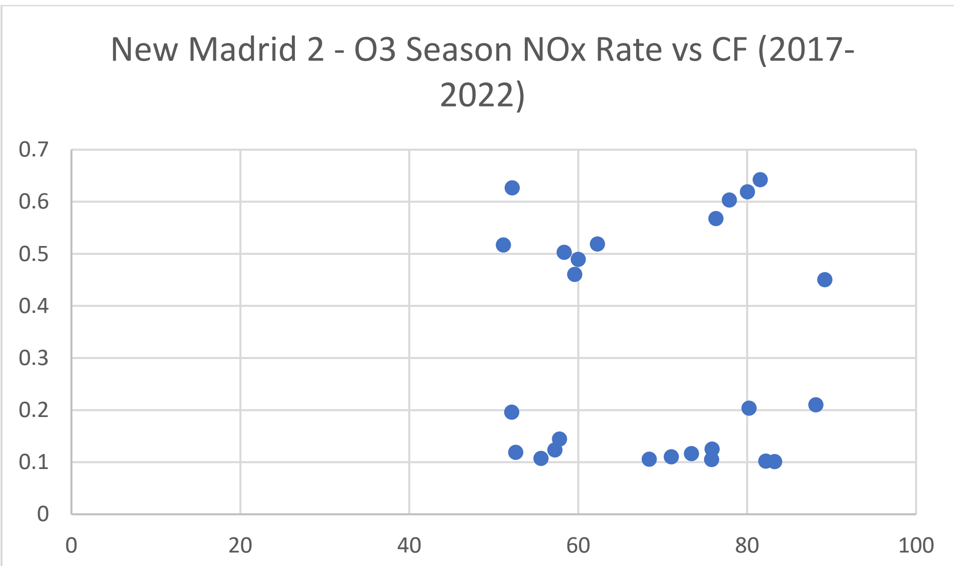


New Madrid 2: Unit 2 (600 MW) at the New Madrid plant was analyzed. Its NOx emissions rates are wildly variable. The unit can reliably achieve NOx emission rates below approximately 0.10 lb/MMBtu. It is clearly not operating its SCR according to the SCR's NOx reduction capacity. During some ozone seasons, it is emitting at 0.64 lb/MMBtu, over 600% of its lowest demonstrated NOx reduction capacity. It is not because of low capacity factor nor MOT issues as the charts below demonstrate.

Plant	Unit	MW	NOx, Min	Nox, Min (Historical)*	NOx, Max	NOx, Max 03 Months
New Madrid	1	600	0.0991	0.08	0.8797	0.8797
New Madrid	2	600	0.1007	0.0764	1.0742	0.6420

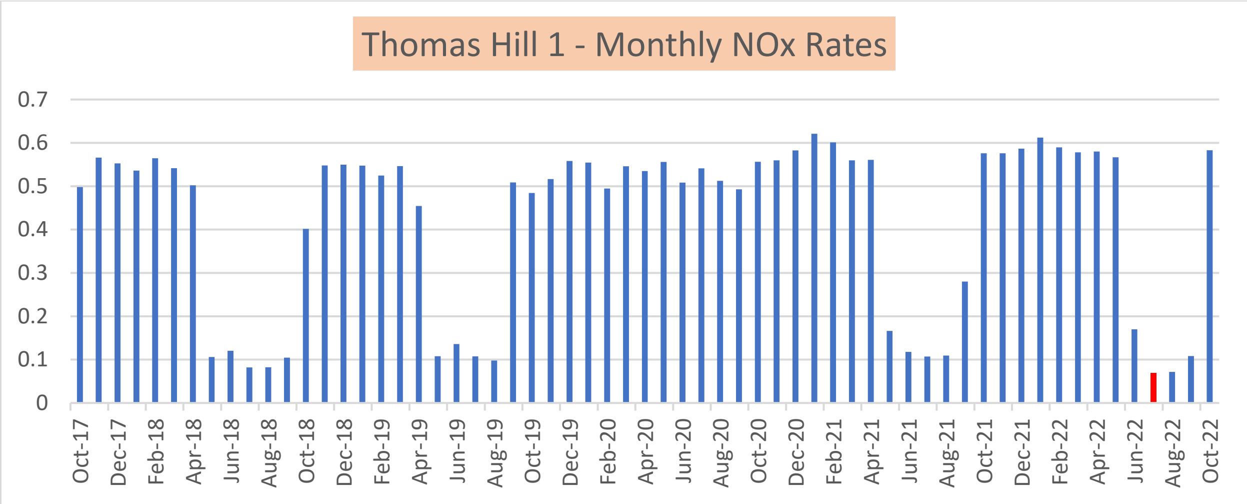


The chart above confirms that New Madrid 2 has reliably achieved levels of approximately 0.10 lb/MMBtu, with a low of .1007 lb/MMBtu. The chart below shows that New Madrid Unit 2 has achieved levels of approximately 0.10 lb/MMBtu over a range of ozone-season operating capacity factors.

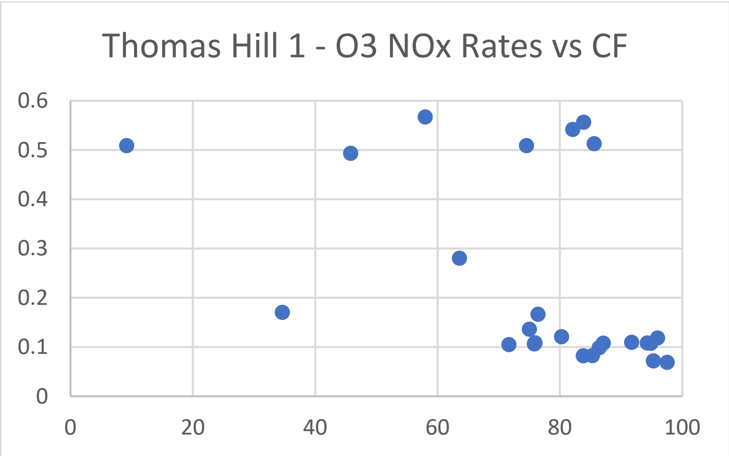


TH 1: Unit 1 (180 MW) at the Thomas Hill plant was analyzed. It has SCR installed. It can clearly achieve reliably lower NOx emission rates. The unit can reliably achieve NOx emission rates of 0.10 lb/MMBtu and below. It is not operating its SCR consistently in accordance with its lowest demonstrated NOx reduction capacity. It is not because of low capacity factor nor MOT issues as the charts below make clear. Indeed, its operation of its SCR is wildly erratic, including between ozone seasons.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Thomas Hill	1	180	0.0686	0.6209	0.5668
Thomas Hill	2	285	0.0825	0.6374	0.5628
Thomas Hill	3	670	0.0775	0.2832	0.2832

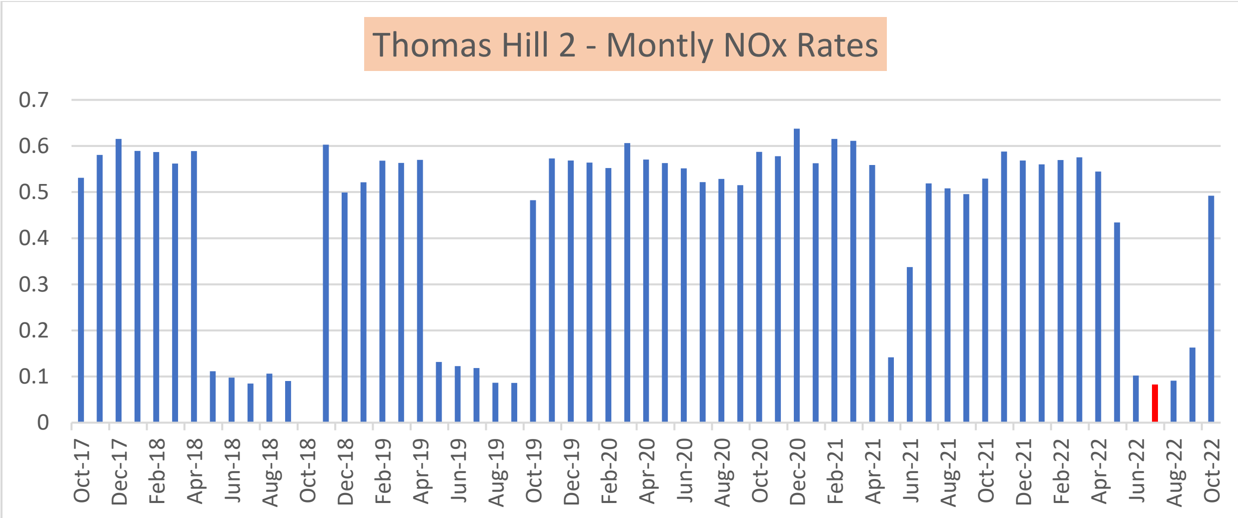


The chart above confirms that Thomas Hill 1 has reliably achieved levels below 0.10 lb/MMBtu, with a low of .0686 lb/MMBtu, shown in red. The chart below shows that Thomas Hill 1 has achieved less than 0.10 lb/MMBtu over a wide range of ozone-season operating capacity factors.

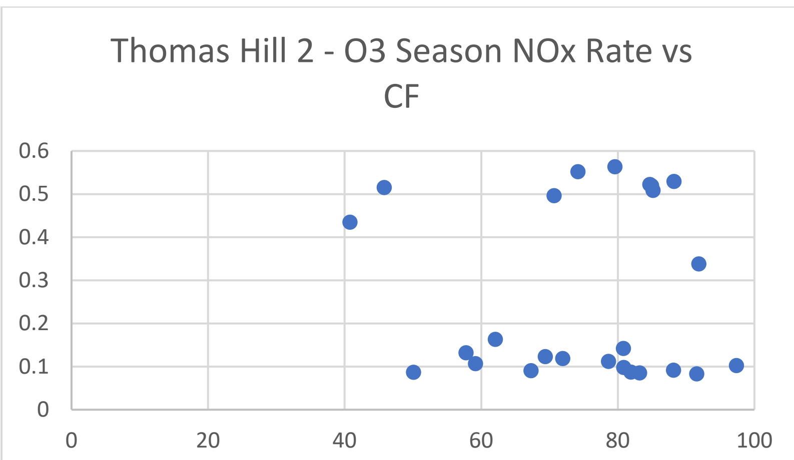


TH 2: Unit 2 (285 MW) at the Thomas Hill plant was analyzed. It has SCR installed. It can clearly achieve reliably lower NOx emission rates. The unit can reliably achieve NOx emission rates of 0.10 lb/MMBtu and below. It is not operating its SCR consistently in accordance with its lowest demonstrated NOx reduction capacity. It is not because of low capacity factor nor MOT issues as the charts below make clear. Indeed, its operation of its SCR is wildly erratic, including between ozone seasons.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Thomas Hill	1	180	0.0686	0.6209	0.5668
Thomas Hill	2	285	0.0825	0.6374	0.5628
Thomas Hill	3	670	0.0775	0.2832	0.2832

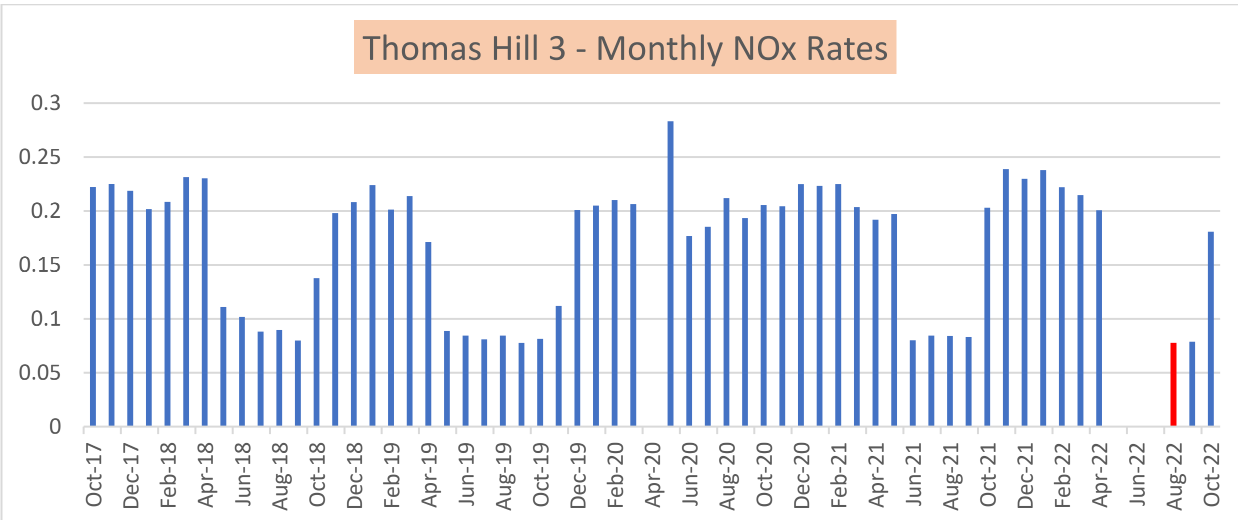


The chart above confirms that Thomas Hill 2 has achieved levels below 0.10 lb/MMBtu, with a low of .0825 lb/MMBtu, shown in red. The chart below shows that Thomas Hill 2 has achieved less than 0.10 lb/MMBtu over a wide range of ozone-season operating capacity factors.

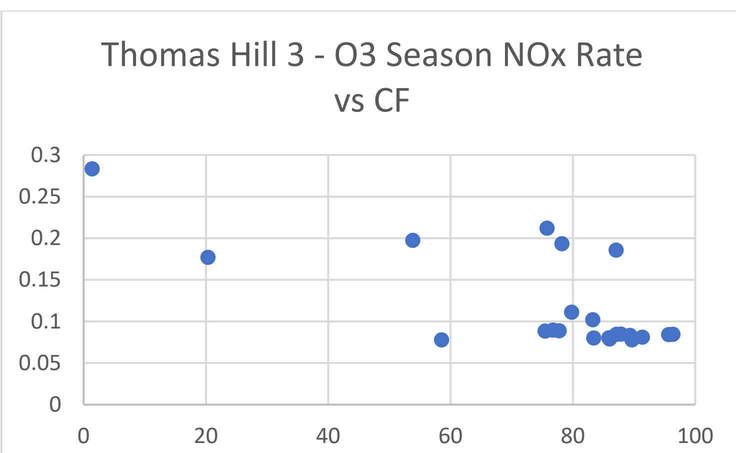


TH 3: Unit 3 (670 MW) at the Thomas Hill plant was analyzed. It has SCR installed. It can clearly achieve reliably lower NOx emission rates. The unit can reliably achieve NOx emission rates of 0.10 lb/MMBtu and below. It is not operating its SCR consistently in accordance with its lowest demonstrated NOx reduction capacity. It is not because of low capacity factor nor MOT issues as the charts below make clear. Indeed, its operation of its SCR is wildly erratic, including between ozone seasons.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Thomas Hill	1	180	0.0686	0.6209	0.5668
Thomas Hill	2	285	0.0825	0.6374	0.5628
Thomas Hill	3	670	0.0775	0.2832	0.2832

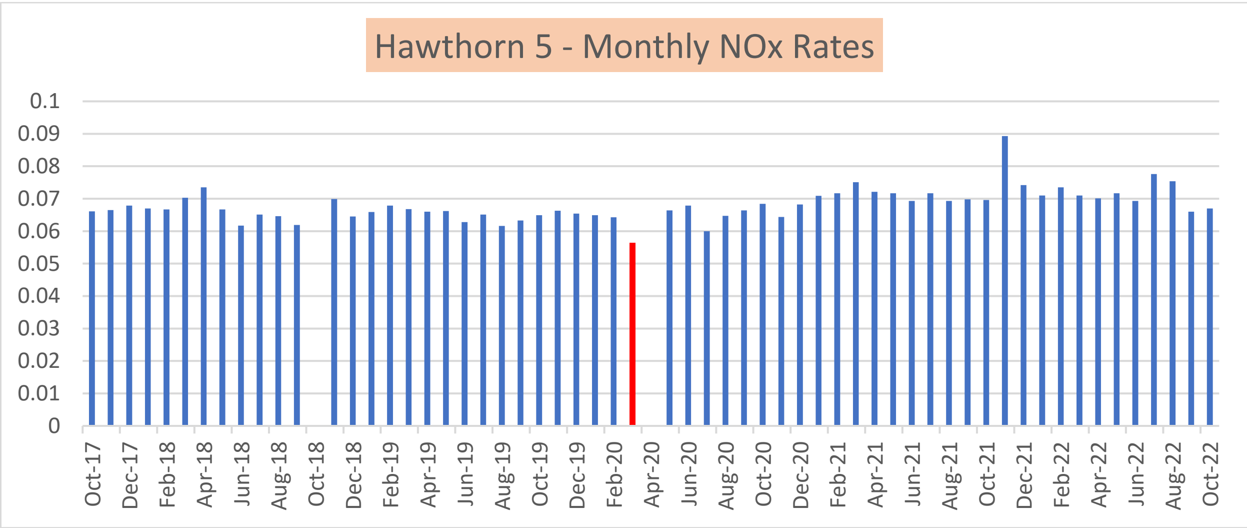


The chart above confirms that Thomas Hill 3 has achieved levels below 0.10 lb/MMBtu, with a low of .0775 lb/MMBtu, shown in red. The chart below shows that Thomas Hill 3 has achieved less than 0.10 lb/MMBtu over a wide range of ozone-season operating capacity factors.

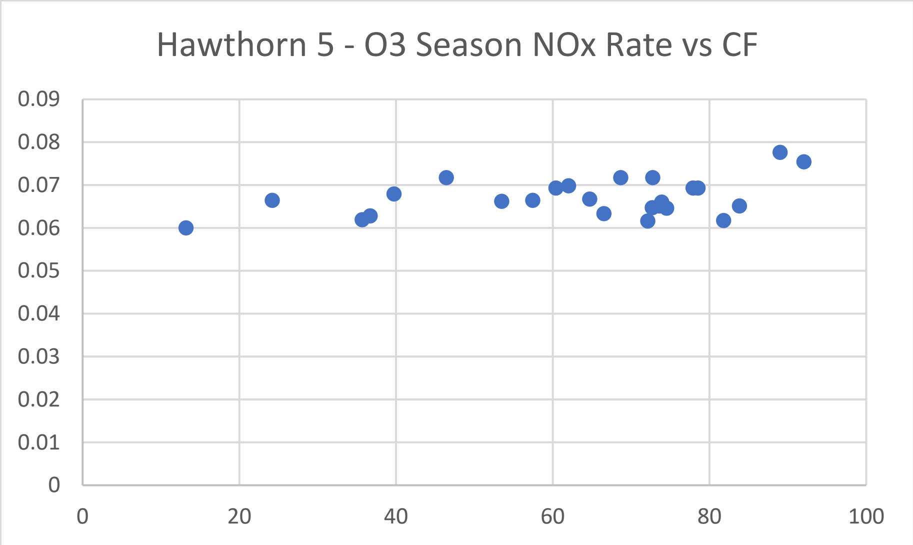


Hawthorn 5: Unit 5 (594 MW) at the Hawthorn plant was analyzed. It has SCR installed. The unit can reliably achieve NOx emissions rates of below 0.07 lb/MMBtu. It is not operating its SCR consistent with its lowest demonstrated NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Hawthorn	5	594	0.0563	0.0893	0.0776



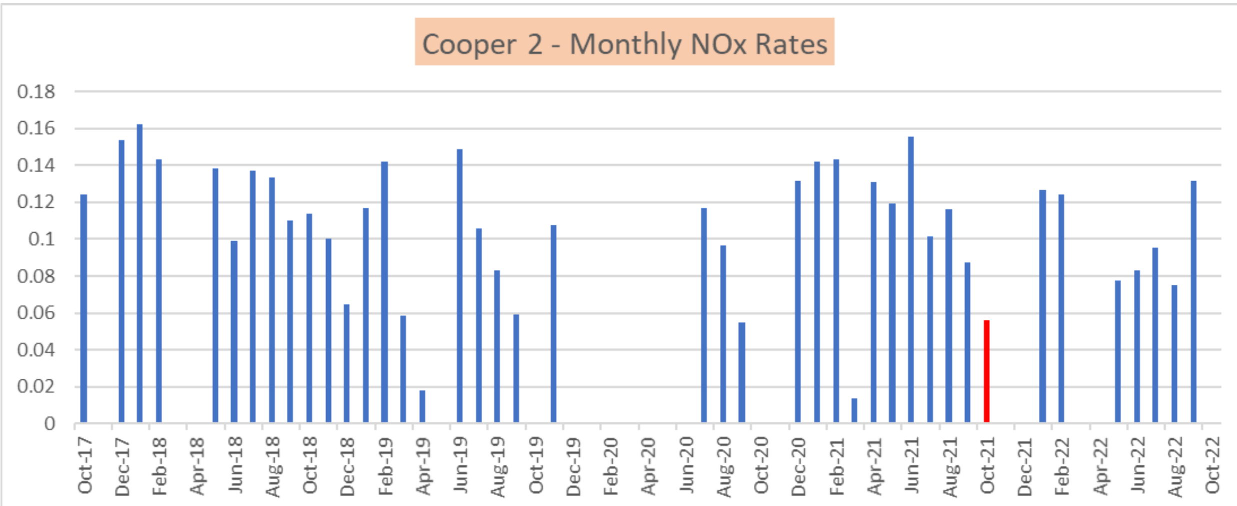
The chart above confirms that Hawthorn Unit 5 has achieved levels below 0.07 lb/MMBtu on many months of recent operation, with a low of 0.0563 lb/MMBtu, shown in red. The chart below shows that Hawthorn Unit 5 has achieved less than 0.07 lb/MMBtu over a range of ozone-season operating capacity factors.



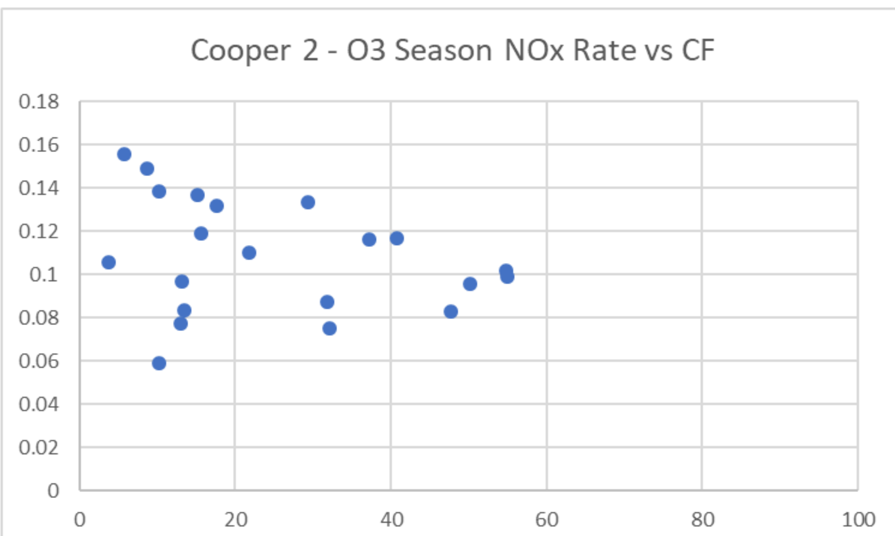
Kentucky

Cooper 2: Unit 2 (230 MW) at the Cooper plant was analyzed. It has SCR installed. It can achieve reliably lower NOx emission rates. The unit can reliably achieve NOx emissions rates of 0.10 lb/MMBtu and below. It is not operating its SCR consistently according to the SCR's lowest demonstrated NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Cooper	2	230	0.0563	0.1625	0.1554

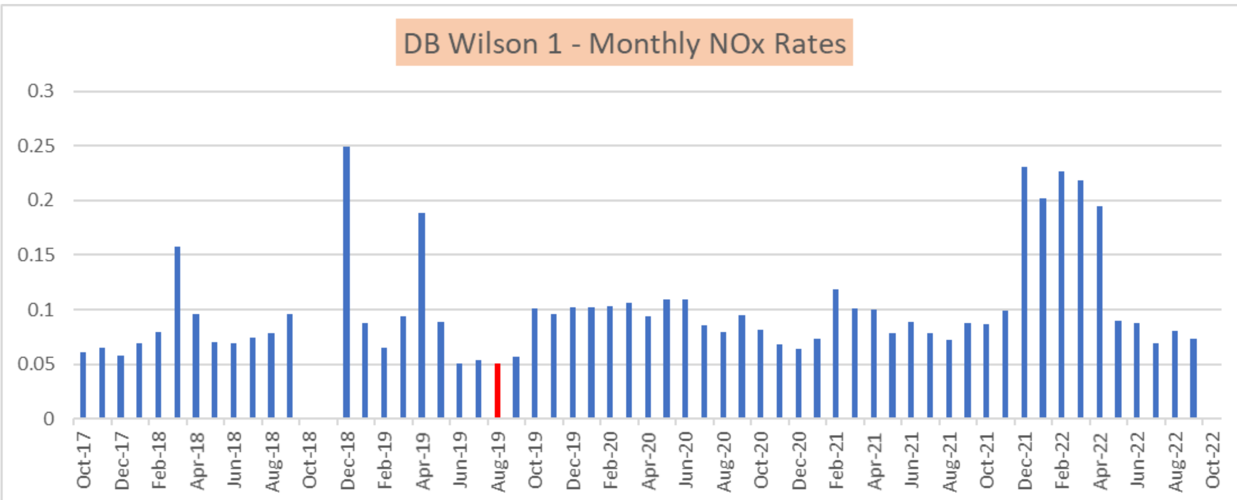


The chart above confirms that Cooper Unit 2 has achieved levels below 0.10 lb/MMBtu on many months of recent operation, with a low of 0.0563 lb/MMBtu, shown in red.

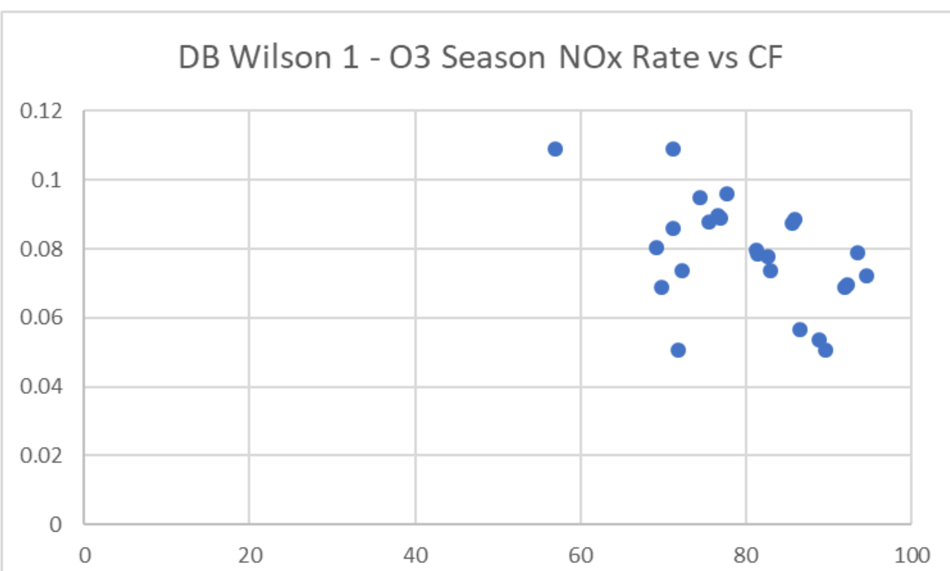


DB Wilson 1: Unit 1 (566 MW) at the DB Wilson plant was analyzed. It has SCR installed. It can reliably achieve NOx emission rates of below 0.07 lb/MMBtu. It is not operating its SCR consistently in accordance with its lowest demonstrated NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
DB Wilson	1	566	0.0505	0.2491	0.1091

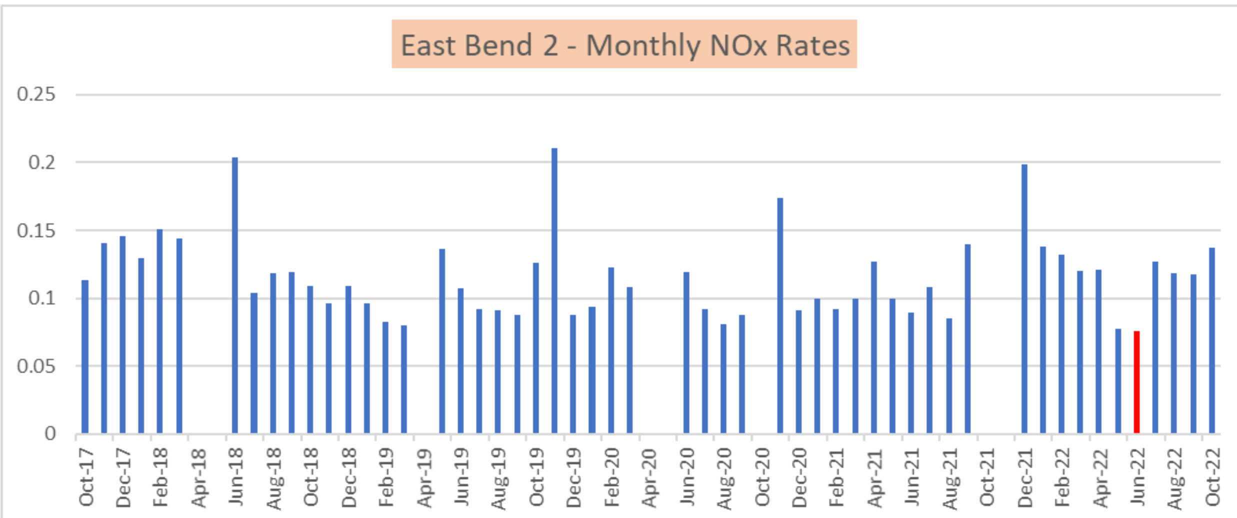


The chart above confirms that DB Wilson Unit 1 can reliably achieve levels below 0.07 lb/MMBtu on several months of operation, with a low of 0.0505 lb/MMBtu, shown in red. The chart below shows that DB Wilson Unit 1 has achieved less than 0.07 lb/MMBtu over a range of ozone-season operating capacity factors.

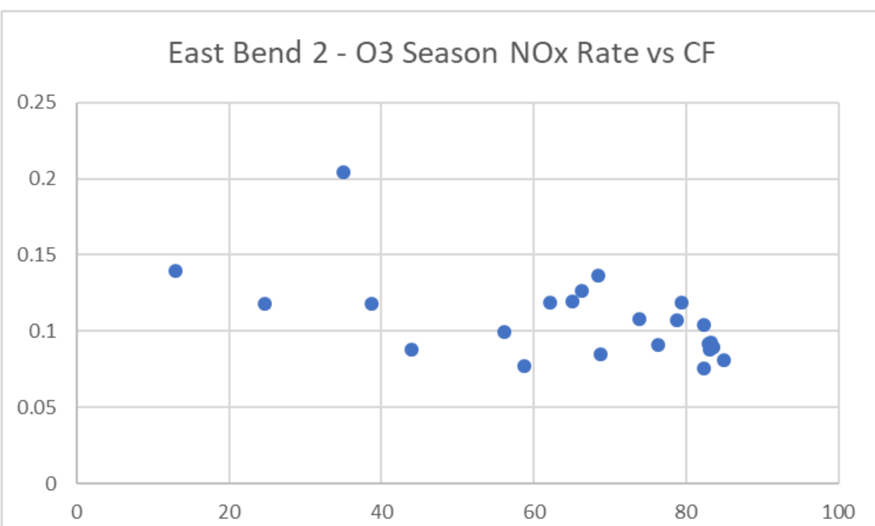


East Bend 2: Unit 2 (669 MW) at the East Bend plant was analyzed. It has SCR installed. It can reliably achieve NOx emission rates of 0.10 lb/MMBtu and below. It is not operating its SCR consistently in accordance with its lowest demonstrated NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
East Bend	2	669	0.0758	0.2110	0.2041

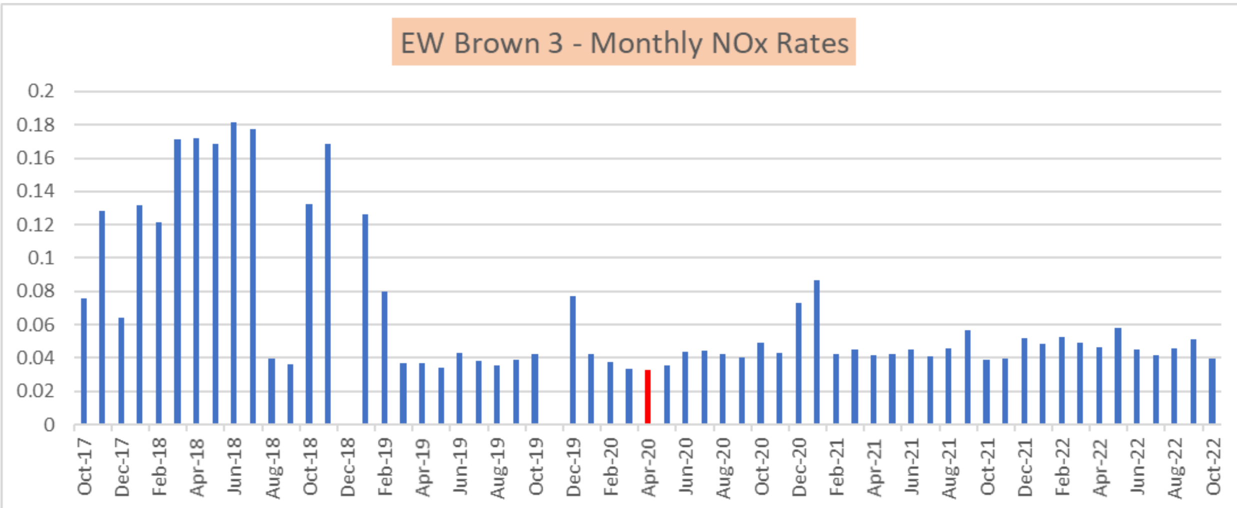


The chart above confirms that East Bend Unit 2 has regularly achieved levels of below 0.10 lb/MMBtu, with a low of 0.0758 lb/MMBtu, shown in red. The chart below shows that East Bend 2 has achieved less than 0.10 lb/MMBtu over a wide range of ozone-season operating capacity factors.

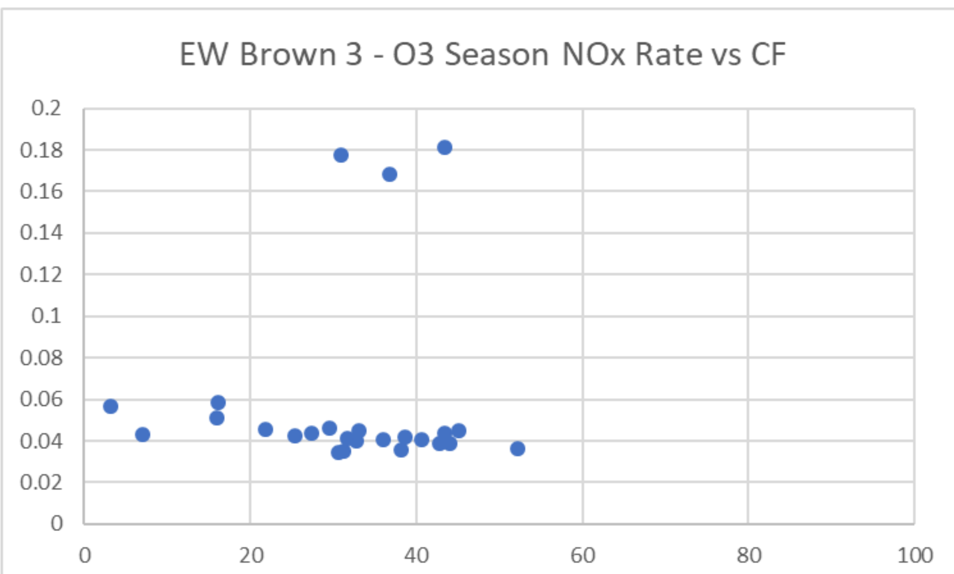


EW Brown 3: Unit 3 (464 MW) at the EW Brown plant was analyzed. It has SCR installed. It can reliably achieve NOx emission rates of approximately 0.04 lb/MMBtu.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
EW Brown	3	464	0.0326	0.1813	0.1813

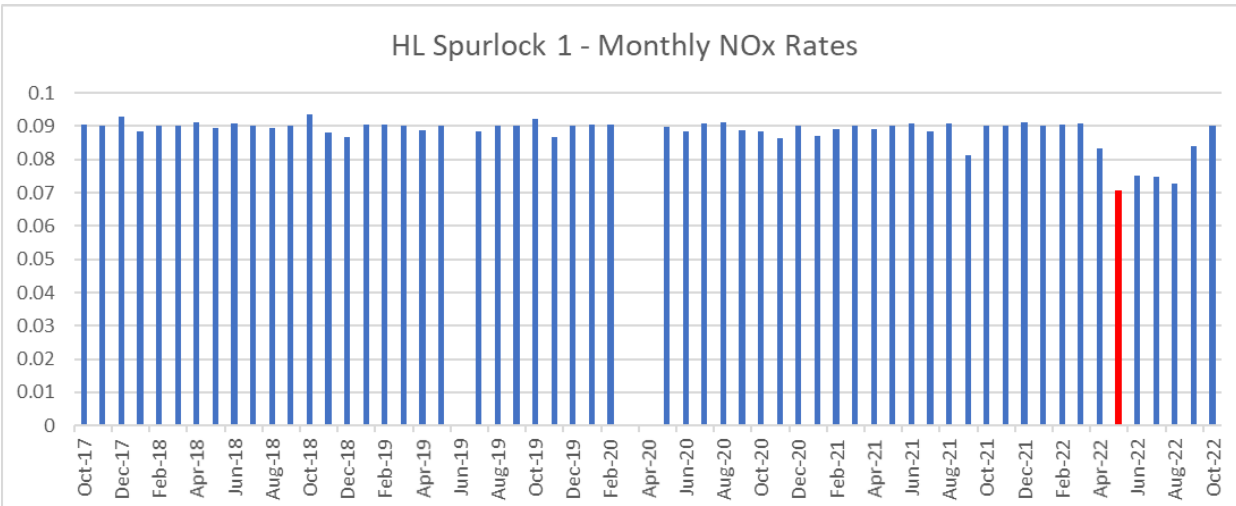


The chart above confirms that EW Brown Unit 3 has regularly achieved levels of approximately 0.04 lb/MMBtu, with a low of 0.0326 lb/MMBtu, shown in red. The chart below shows that EW Brown Unit 3 has achieved less than 0.04 lb/MMBtu over a wide range of ozone-season operating capacity factors.

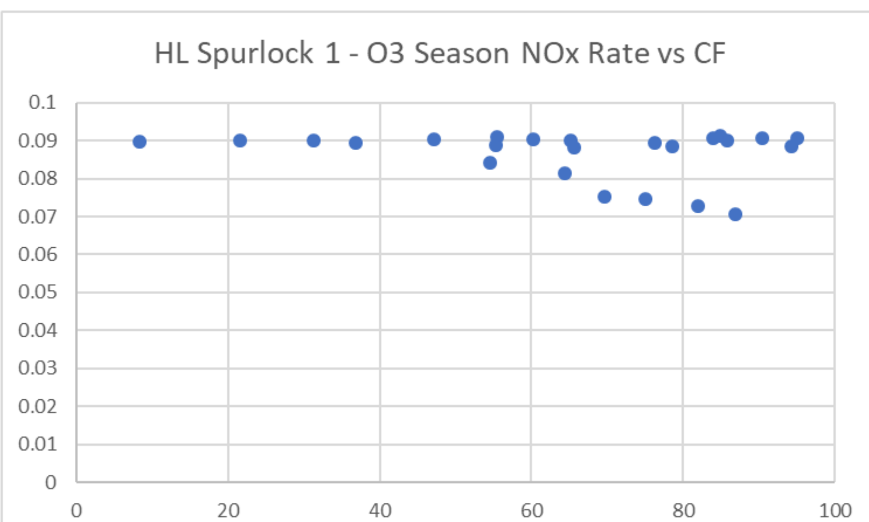


HL Spurlock 1: Unit 1 (385 MW) at the HL Spurlock plant was analyzed. It has SCR installed. It can reliably achieve NOx emission rates of 0.09 lb/MMBtu.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
HL Spurlock	1	358	0.0707	0.0936	0.0912
HL Spurlock	2	592	0.0604	0.1290	0.0921

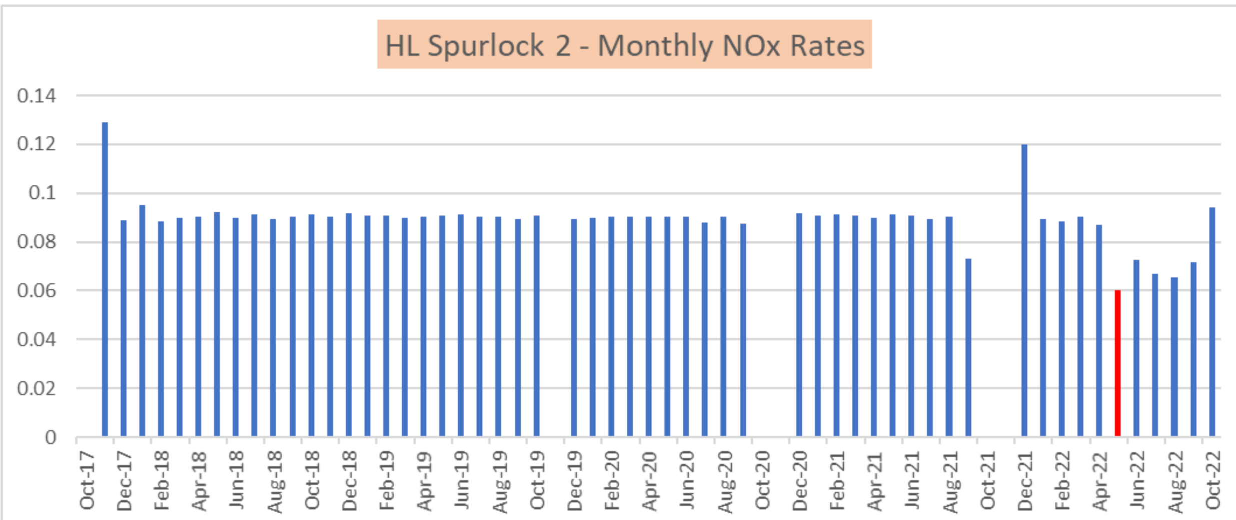


The chart above confirms that Spurlock Unit 1 reliably achieves NOx emissions of below 0.09 lb/MMBtu, and has maintained NOx emissions of below 0.08 lb/MMBtu during the 2022 ozone season, with a low of 0.0707 lb/MMBtu, shown in red. The chart below shows that Spurlock 1 has achieved less than 0.09 lb/MMBtu and below over a wide range of ozone-season operating capacity factors.

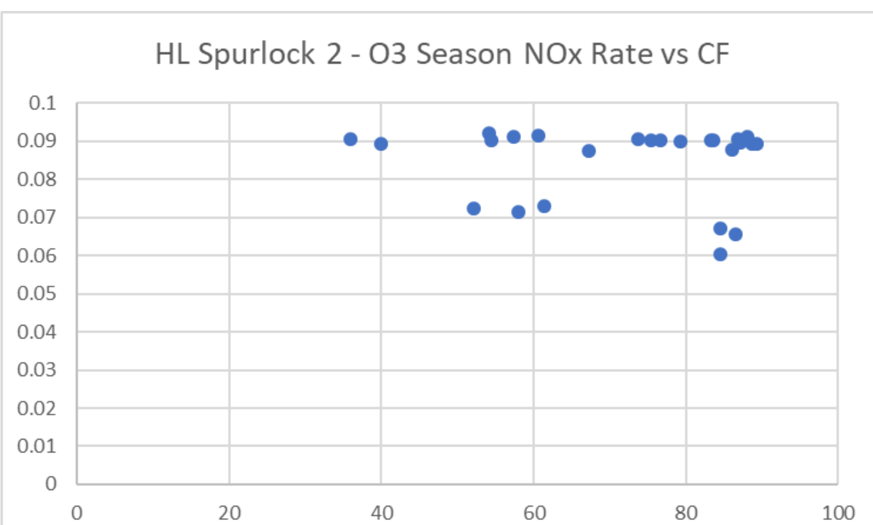


HL Spurlock 2: Unit 2 (592 MW) at the Spurlock 2 plant was analyzed. It has SCR installed. It can reliably achieve NOx emission rates of 0.09 lb/MMBtu.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
HL Spurlock	1	358	0.0707	0.0936	0.0912
HL Spurlock	2	592	0.0604	0.1290	0.0921

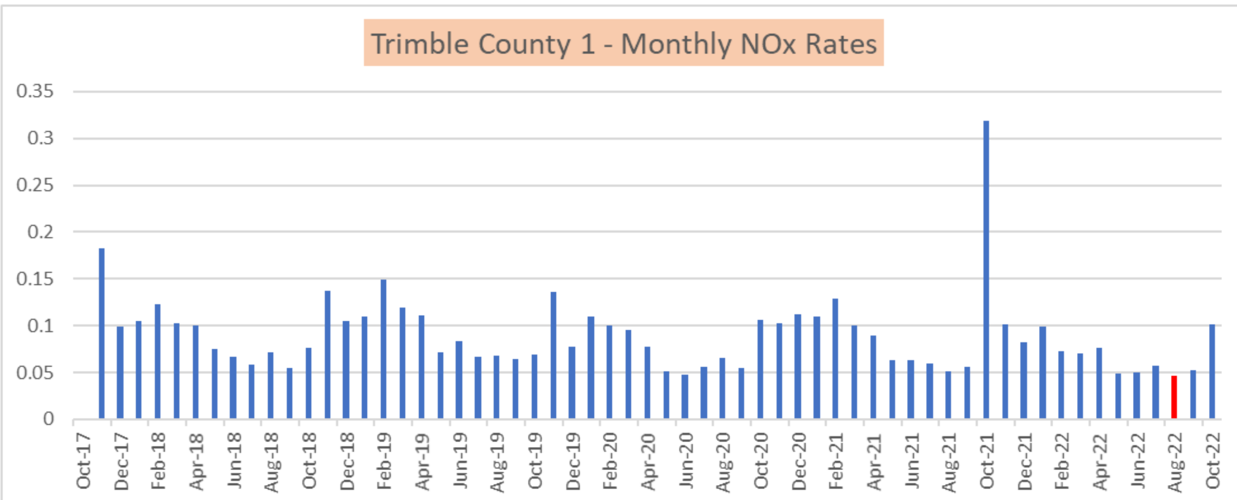


The chart above confirms that Spurlock Unit 2 reliably achieves NOx emissions of below 0.09 lb/MMBtu, and has maintained NOx emissions of below 0.08 lb/MMBtu during the 2022 ozone season, with a low of 0.0604 lb/MMBtu, shown in red. The chart below shows that Spurlock 2 has achieved less than 0.09 lb/MMBtu and below over a range of ozone-season operating capacity factors.

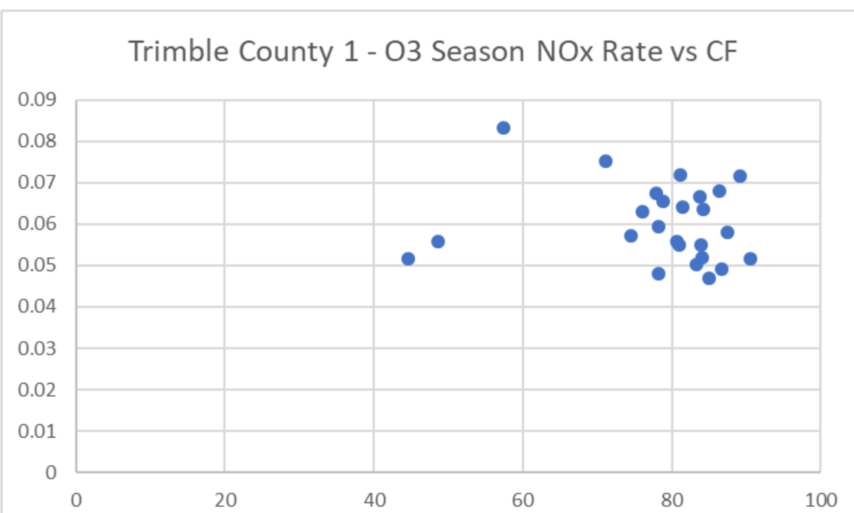


TC 1: Unit 1 (566 MW) at the Trimble County plant was analyzed. It has SCR installed. It can reliably achieve NOx emission rates of 0.07 lb/MMBtu and below, regularly achieving approximately 0.05 lb/MMBtu during ozone seasons 2022, 2021, and 2020. It is clearly not operating its SCR according to the SCR's NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Trimble County	1	566	0.0470	0.3192	0.0832
Trimble County	2	834	0.0257	0.3788	0.0757

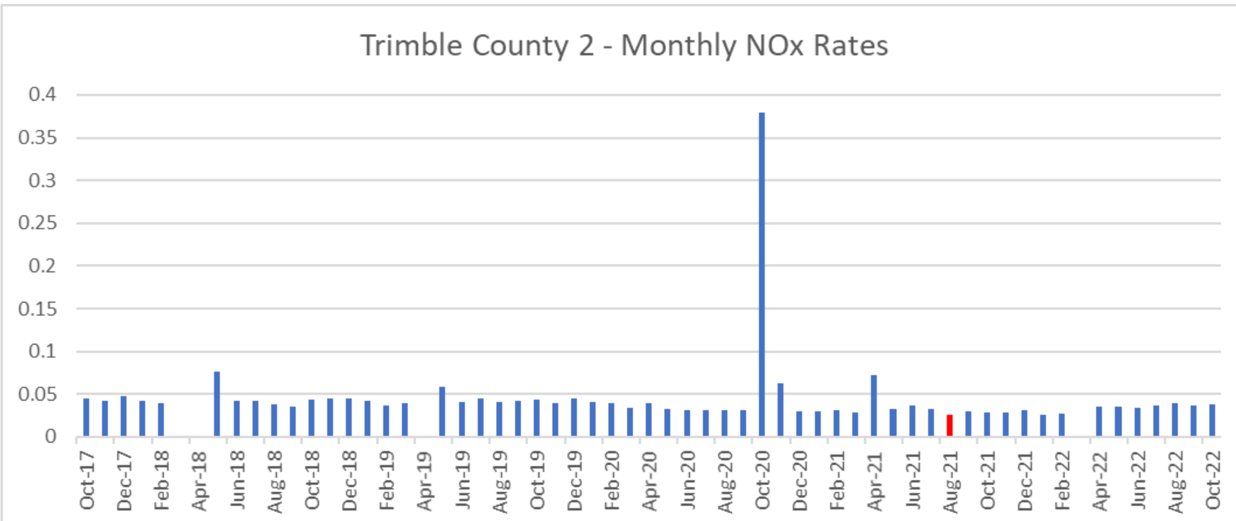


The chart above confirms that Trimble County 1 has achieved levels below 0.05 lb/MMBtu, with a low of .0470 lb/MMBtu, shown in red. The chart below shows that Trimble County 1 has achieved less than 0.05 lb/MMBtu over a range of ozone-season operating capacity factors.

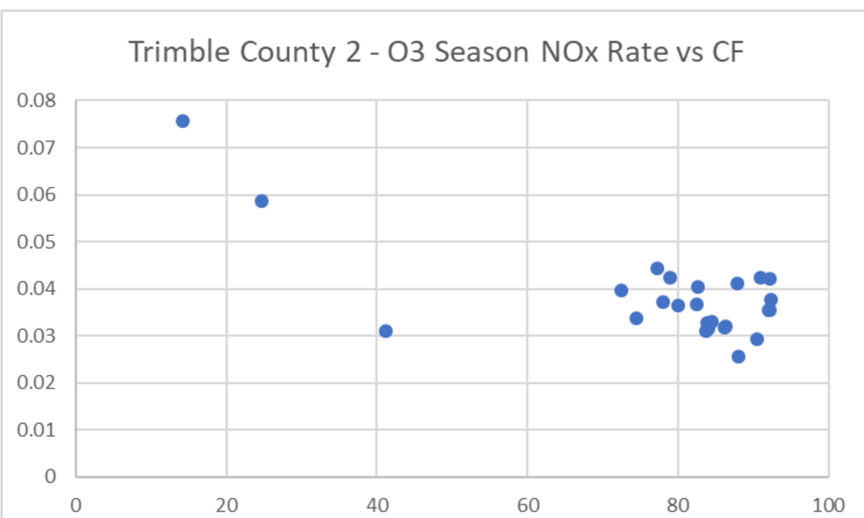


TC 2: Unit 2 (834 MW) at the Trimble County plant was analyzed. It has SCR installed. It can reliably achieve NOx emission rates below 0.05 lb/MMBtu.

Plant	Unit	MW	NOx, Min	NOx, Max	NOx, Max 03 Months
Trimble County	1	566	0.0470	0.3192	0.0832
Trimble County	2	834	0.0257	0.3788	0.0757

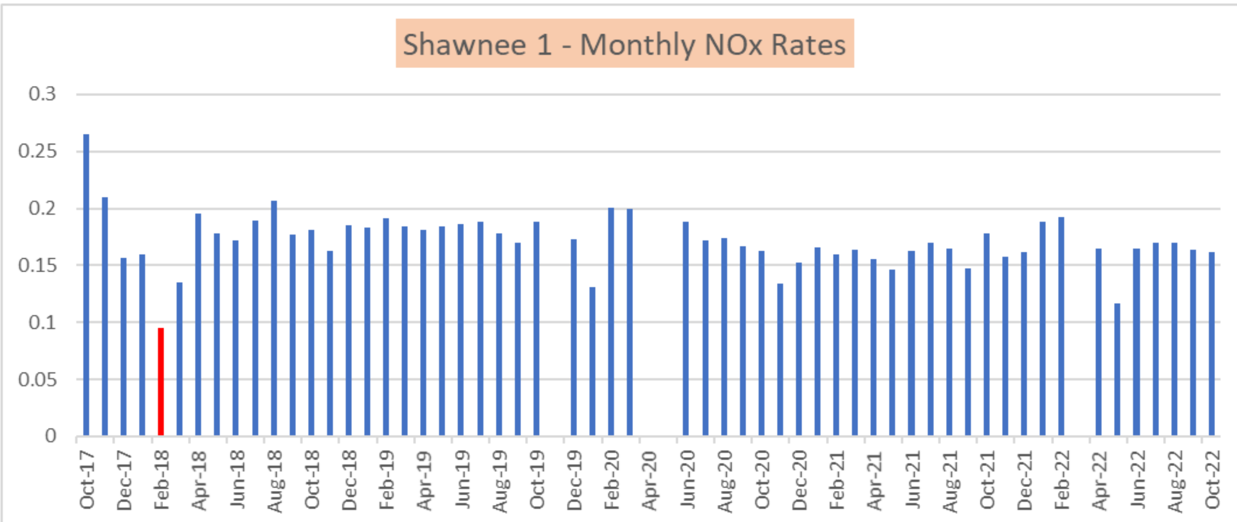


The chart above confirms that Trimble County 2 has often achieved levels well below 0.05 lb/MMBtu, with a low of .0257 lb/MMBtu, shown in red. The chart below shows that Trimble County 2 has achieved less than 0.05 lb/MMBtu over a range of ozone-season operating capacity factors.

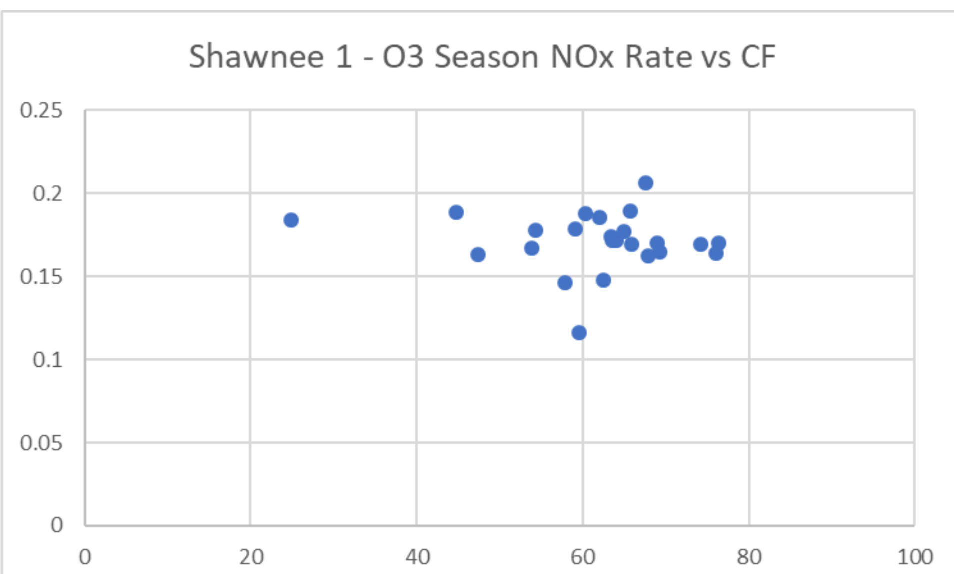


Shawnee 1: Unit 1 (175 MW) at the Shawnee plant was analyzed. It has SCR installed. Its NOx emissions rates, which are regularly above 0.15 lb/MMBtu, are inconsistent with the capabilities of SCR technology.

Plant	Unit	MW	NOx, Min	Nox, Min (Historical)*	NOx, Max	NOx, Max 03 Months
Shawnee	1	175	0.0954	N/A	0.2655	0.2063
Shawnee	4	175	0.1045	0.1045	0.2517	0.2057

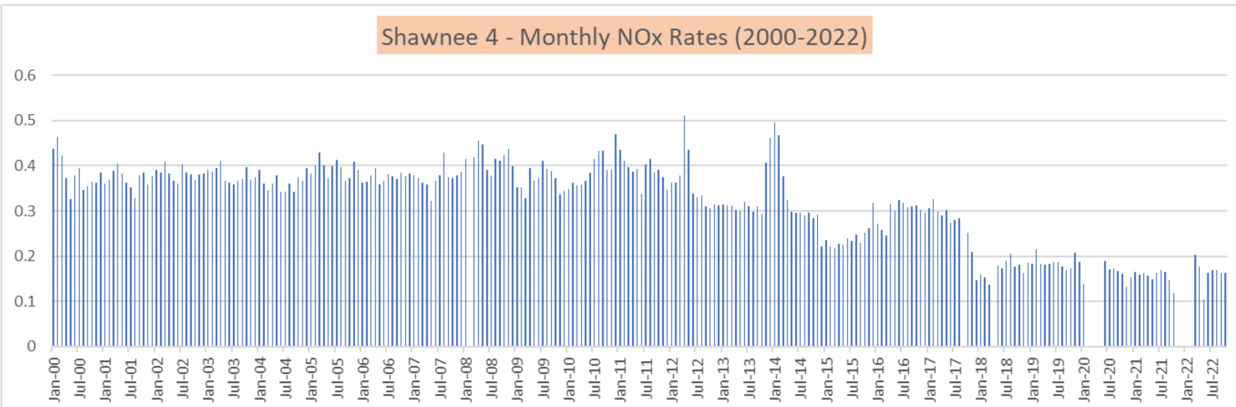


The chart above confirms that Shawnee 1 has consistently exceeded 0.15 lb/MMBtu, and on occasion has been shown to reduce NOx emissions rates to below 0.10 lb/MMBtu, with a low of .0954 lb/MMBtu, shown in red. The chart below shows that Shawnee 1's high emission rates are consistent over a wide range of ozone-season operating capacity factors.

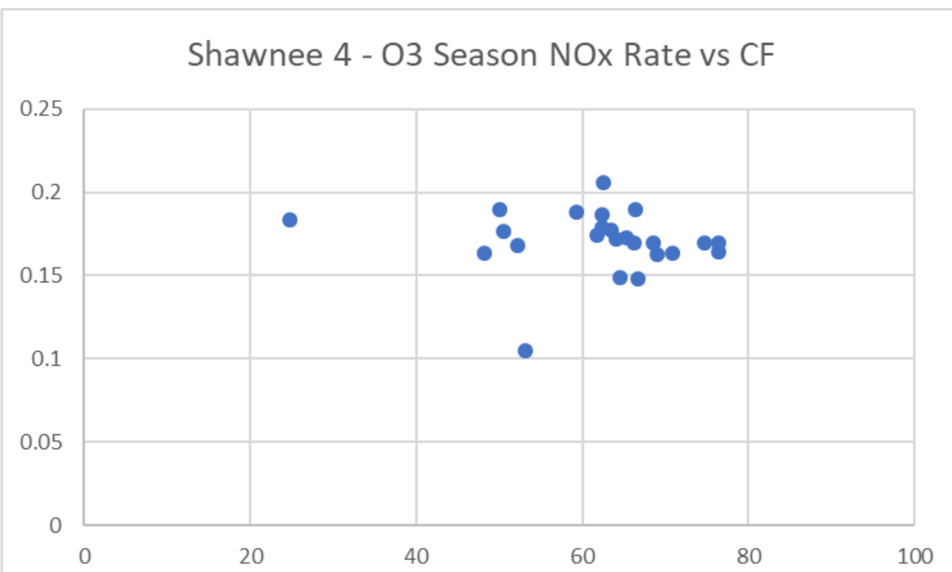


Shawnee 4: Unit 4 (175 MW) at the Shawnee plant. It has SCR installed. Its NOx emissions rates, which are regularly above 0.15 lb/MMBtu, are inconsistent with the capabilities of SCR technology.

Plant	Unit	MW	NOx, Min	Nox, Min (Historical)*	NOx, Max	NOx, Max 03 Months
Shawnee	1	175	0.0954	N/A	0.2655	0.2063
Shawnee	4	175	0.1045	0.1045	0.2517	0.2057

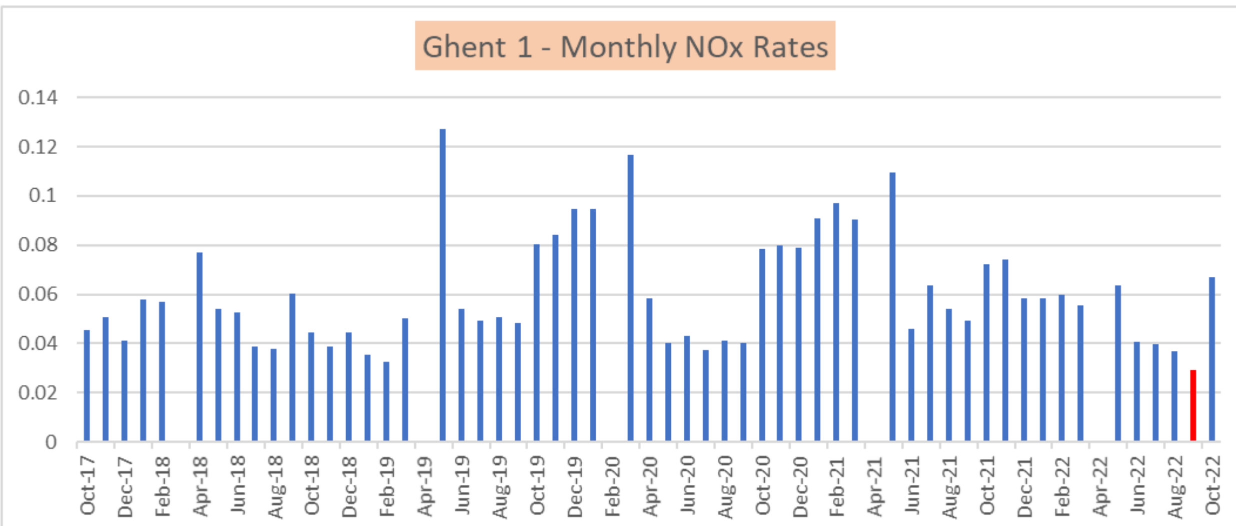


The chart above confirms that Shawnee 4 consistently emits at very high NOx emissions rates, often in excess of 0.15 lb/MMBtu, even during ozone seasons, with a low of .1045 lb/MMBtu, shown in red. The chart below shows that Shawnee 4's high emission rates are consistent over a wide range of ozone-season operating capacity factors.

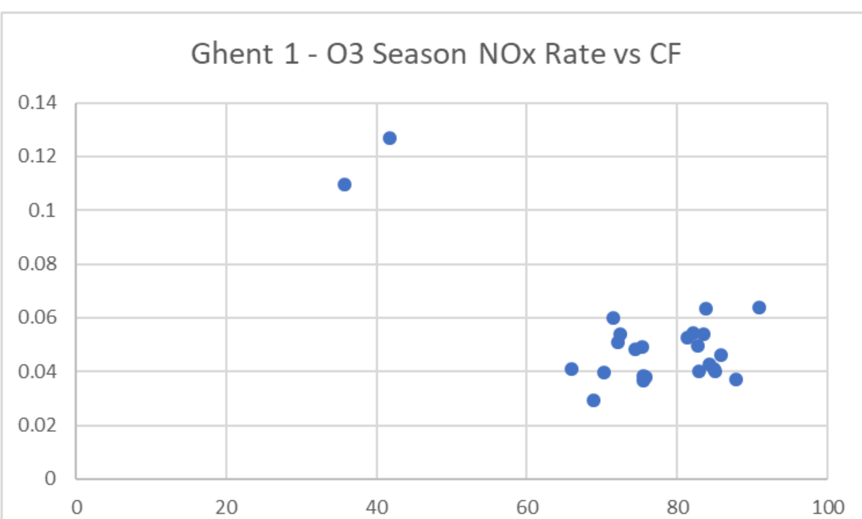


Ghent 1: Unit 1 (557 MW) at the Ghent plant was analyzed. It has SCR installed. It can reliably achieve NOx emission rates of below 0.04 lb/MMBtu. It is not operating its SCR consistently in accordance with its lowest demonstrated NOx reduction capabilities, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	Nox, Min (Historical)*	NOx, Max	NOx, Max 03 Months
Ghent	1	557	0.0292	N/A	0.1271	0.1271
Ghent	2	556	0.1383	0.1362	0.3045	0.2192
Ghent	3	557	0.0627	N/A	0.3012	0.2059
Ghent	4	556	0.0268	N/A	0.1504	0.0842

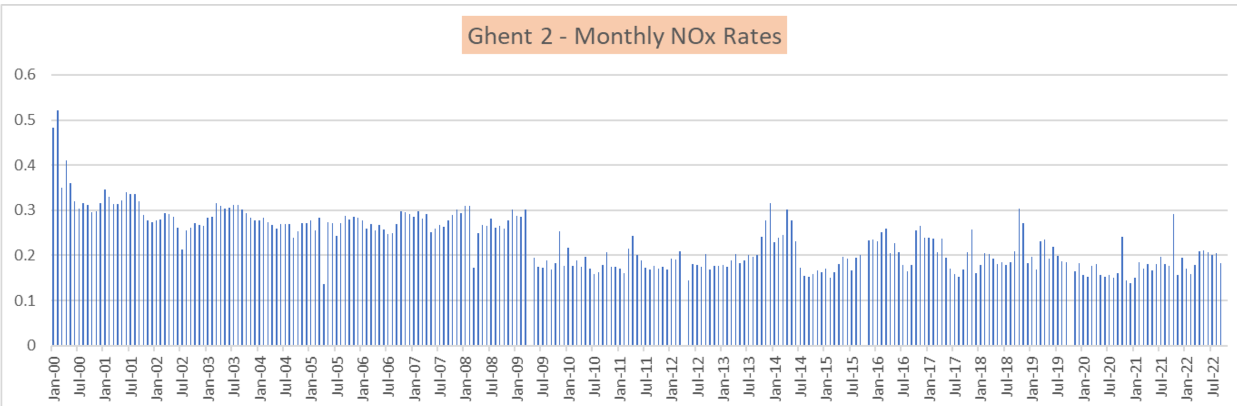


The chart above confirms that Ghent 1 has achieved levels below 0.04 lb/MMBtu, with a low of .0292 lb/MMBtu, shown in red. The chart below shows that Ghent 1 has achieved less than 0.04 lb/MMBtu over a range of ozone-season operating capacity factors.

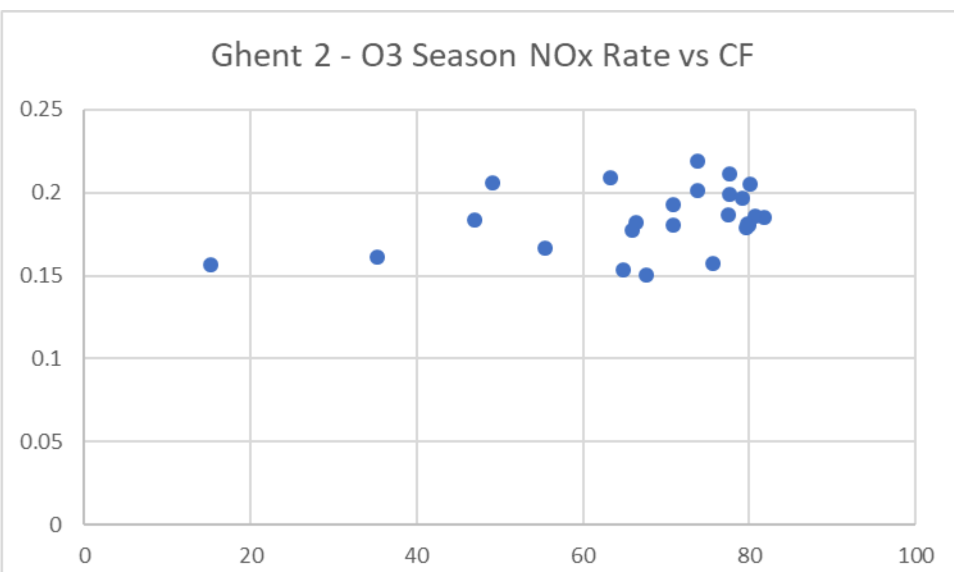


Ghent 2: Unit 2 (556 MW) at the Ghent plant was analyzed. It has SCR installed. Its NOx emissions rates, which are regularly above 0.15 lb/MMBtu, are inconsistent with the capabilities of SCR technology.

Plant	Unit	MW	NOx, Min	Nox, Min (Historical)*	NOx, Max	NOx, Max 03 Months
Ghent	1	557	0.0292	N/A	0.1271	0.1271
Ghent	2	556	0.1383	0.1362	0.3045	0.2192
Ghent	3	557	0.0627	N/A	0.3012	0.2059
Ghent	4	556	0.0268	N/A	0.1504	0.0842

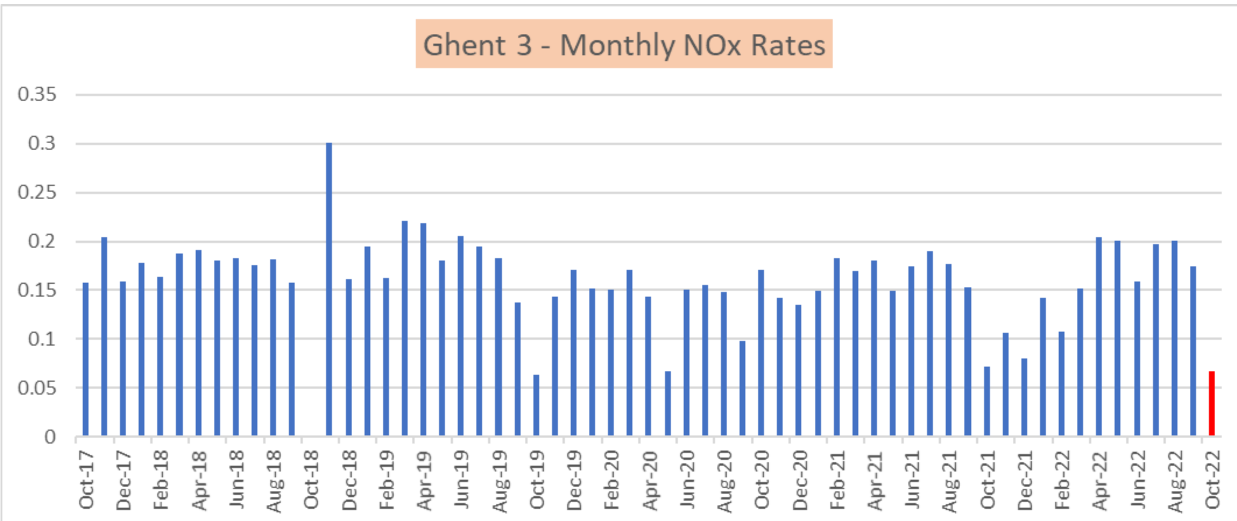


The chart above confirms that Ghent 2 consistently emits at very high NOx emissions rates, often in excess of 0.15 lb/MMBtu, even during ozone seasons, with a low of .1383 lb/MMBtu, shown in red. The chart below shows that Ghent 2's high emission rates are consistent over a wide range of ozone-season operating capacity factors.

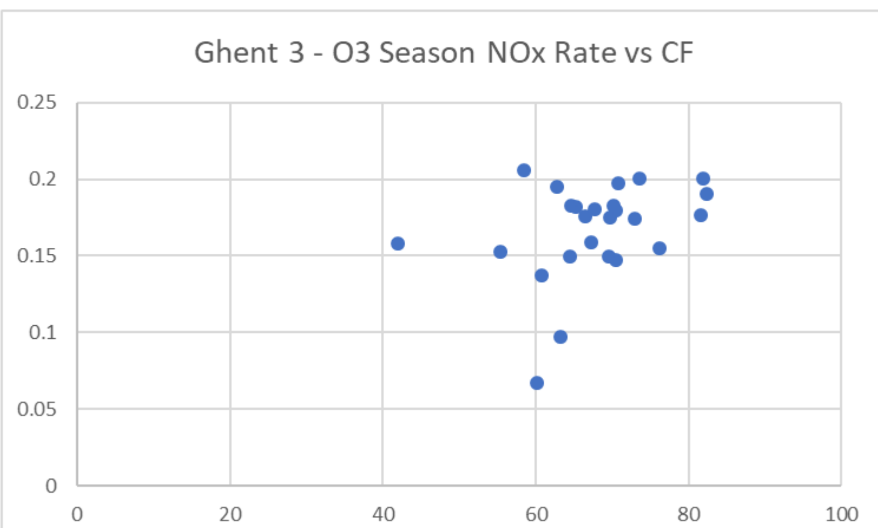


Ghent 3: Unit 3 (557 MW) at the Ghent plant was analyzed. It has SCR installed. Its NOx emissions rates, which are regularly above 0.15 lb/MMBtu, are inconsistent with the capabilities of SCR technology.

Plant	Unit	MW	NOx, Min	Nox, Min (Historical)*	NOx, Max	NOx, Max 03 Months
Ghent	1	557	0.0292	N/A	0.1271	0.1271
Ghent	2	556	0.1383	0.1362	0.3045	0.2192
Ghent	3	557	0.0627	N/A	0.3012	0.2059
Ghent	4	556	0.0268	N/A	0.1504	0.0842

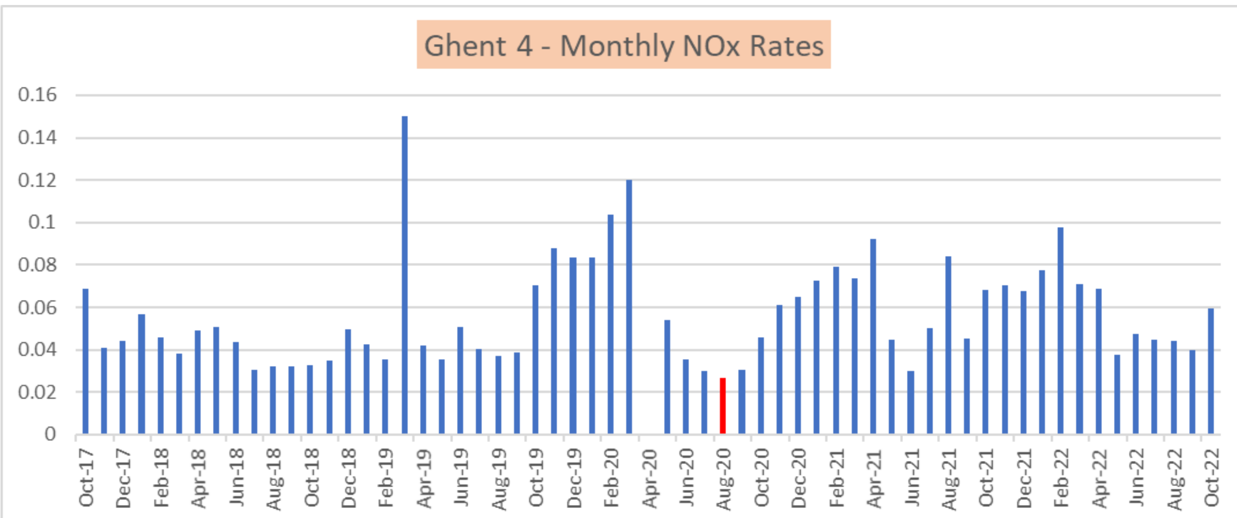


The chart above confirms that Ghent 3 consistently emits at very high NOx emissions rates, often in excess of 0.15 lb/MMBtu, even during ozone seasons, with a low of .0627 lb/MMBtu, shown in red. The chart below shows that Ghent 3's high emission rates are consistent over a wide range of ozone-season operating capacity factors.

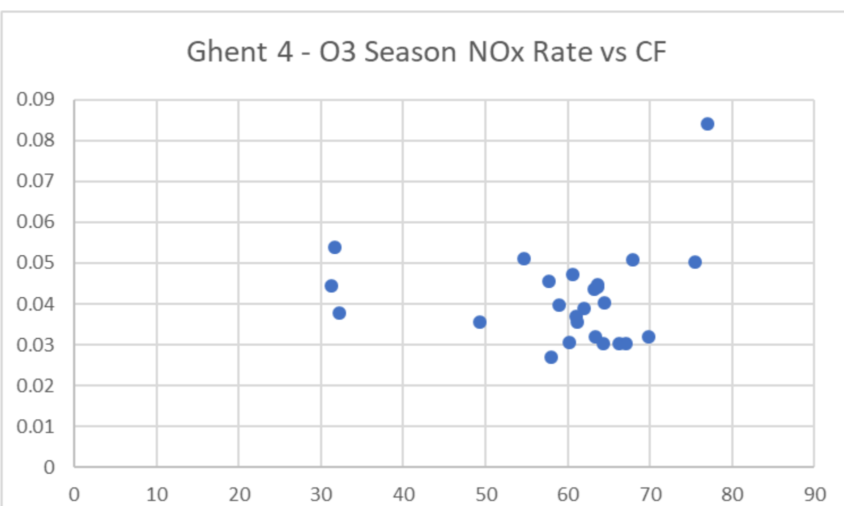


Ghent 4: Unit 3 (556 MW) at the Ghent plant was analyzed. It has SCR installed. It can reliably achieve NOx emission rates below 0.04 lb/MMBtu. It is not operating its SCR consistently in accordance with its lowest demonstrated NOx reduction capacity, and it is not because of low capacity factor nor MOT issues as the charts below make clear.

Plant	Unit	MW	NOx, Min	Nox, Min (Historical)*	NOx, Max	NOx, Max 03 Months
Ghent	1	557	0.0292	N/A	0.1271	0.1271
Ghent	2	556	0.1383	0.1362	0.3045	0.2192
Ghent	3	557	0.0627	N/A	0.3012	0.2059
Ghent	4	556	0.0268	N/A	0.1504	0.0842



The chart above confirms that Ghent 4 has often achieved levels below 0.04 lb/MMBtu, with a low of .0268 lb/MMBtu, shown in red. The chart below shows that Ghent 4 has achieved less than 0.04 lb/MMBtu over a wide range of ozone-season operating capacity factors.



August 6, 2021

Texas Commission on Environmental Quality

Office of the Chief Clerk (MC-105)

P.O. Box 13087

Austin, Texas 78711-3087

Re: Request for Reasonably Available Control Measures Ideas

Dear Commissioners,

Sierra Club and Earthjustice submit these comments, on behalf of themselves and their thousands of members and supporters who are injured by ozone pollution in the Dallas-Fort Worth ("DFW") and Houston-Galveston-Brazoria Nonattainment Areas, on ideas for potential reasonably available control measures ("RACM").[1]

We also submit and incorporate by reference the attached previously submitted comments: (1) Sierra Club's 2015 Comments on the Texas Commission's 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 [hereinafter, "2015 Comments"][2]; (2) Sierra Club's 2016 Comments on Texas's Proposed Dallas-Fort Worth 2008 Eight-Hour Ozone Nonattainment Area Demonstration ("AD") State Implementation Plan ("SIP") Revision for the 2017 Attainment Year, SIP Project No. 2015-014-SIP-NR [hereinafter, "2016 Comments"][3]; (3) Sierra Club and Earthjustice's 2019 Comments on the Proposed Houston-Galveston-Brazoria ("HGB") Serious Classification Attainment Demonstration (AD) State Implementation Plan ("SIP") Revision for the 2008 Eight-Hour Ozone National Ambient Air Quality Standard ("NAAQS"), Rule Project No. 2019-077-SIP-NR[4]; and (4) Sierra Club's Comments on Commission Approval for Proposed Rulemaking

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[1] In these comments, we discuss only RACM for the DFW and Houston nonattainment areas. The general methodologies we discuss here further apply to RACM for the San Antonio nonattainment area, however, and we urge TCEQ to apply a rigorous analysis of RACM, examining, for example, what the Ozone Transport Commission has recommended for sources similar to those prevalent in and affecting the San Antonio area.

[2] *See* Ex. 1.

[3] *See* Ex. 2.

[4] *See* Ex. 3.

Chapter 115, Control of Air Pollution from Volatile Organic Compounds VOC RACT Rules for Oil and Natural Gas CTG Rule, Project No. 2020-038-115-AI.[5] To attain the 2008 and 2015 National Ambient Air Quality Standards for ozone as expeditiously as practicable, as required by the Clean Air Act, 42 U.S.C. § 7502(c)(1), TCEQ must implement *all* reasonably available control measures, – including emission reduction measures for major and minor sources both in and out of the DFW and HGB areas.

Ground-Level Ozone is Dangerous to Human Health

Scientific research continues to strengthen our understanding of the harm that ozone causes to public health. Exposure to ozone is connected to a wide range of significant human health impacts including respiratory and cardiovascular harms, premature deaths, perinatal and reproductive impacts, and central nervous system and developmental harms. Serious health impacts have been demonstrated through controlled human exposure, epidemiologic, and toxicological studies. The physiological impacts of ozone exposure are experienced even by healthy individuals and even at relatively low concentrations of ozone. Moreover, there is a growing body of scientific evidence showing that repeated exposure over time causes additional health impacts, which may be more severe and less likely to be reversible.

Ozone exposure has also 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.[6] 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.[7]

Texas's failing air quality has serious and well-documented health consequences for the approximately 14 million Texans that live in the DFW and Houston areas, where EPA has deemed the air quality unsafe to breathe.[8] Indeed, in the Dallas-Fort Worth area, 14% of adults have asthma—the highest asthma

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[5] *See* Ex. 4.

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

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

[8] http://quickfacts.census.gov/qfd/maps/texas_map.html.

prevalence in adults in Texas.[9] 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.[10] 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 in Texas had asthma.[11]

Children, the elderly, minorities, and low-income households are especially sensitive to ground-level smog, and often bear a disproportionate asthma burden. 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. And Figure 5 below, Black Texans are nearly 2.5 times more likely to die from asthma than white Texans.[12] The health impacts of increased respiratory and cardiovascular disease have become even more exasperated as the country, Texas in particular, has experienced large percentages of minority communities facing higher hospitalizations and mortalities due to COVID-19.

RACM for the Houston-Galveston-Brazoria Nonattainment Area

The Houston area has a long history of failing to timely attain ozone standards, indicating that existing measures fall short of constituting RACM. We are glad that TCEQ is requesting ideas for RACM even before the Houston area is formally again bumped up for failing to timely attain ozone standards. To improve public health by reducing emissions of ozone-forming precursors beyond existing levels, TCEQ must move expeditiously to strengthen control measures and make a timely SIP submission.

In 2019, less than two years ago, we submitted extensive technical comments submitted to TCEQ on its do-nothing RACM proposal for the Houston nonattainment area under the 2008 ozone standard. We summarize those

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[9] Texas Dep't of State Health Services, 2014 Texas Asthma Burden Report at 7, *available at* https://www.dshs.state.tx.us/asthma/pdf/2014BurdenRpt.doc ("2014 Texas Asthma Report"). Texas no long publishes its annual asthma burden report, so the 2014 data is the most current.

[10] 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.

[11] 2014 Texas Asthma Burden Report, https://www.dshs.state.tx.us/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=8589994855.

[12] *Id*. at 20.

comments here and incorporate them by reference and reattach them for your convenience. TCEQ effectively refused to consider the proposed measures on the grounds that they were not RACM because they could not advance attainment by at least a year. But the reason why they would not have advanced attainment was because TCEQ had fallen behind on developing its RACM SIP. That excuse is not available now.

The 2019 comments solely examine stationary sources, and, regarding the Houston area, focus on NOx reductions from all large sources, reduction of both NOx and VOCs from refineries, and reduction of VOCs from some storage tanks at refineries. Accordingly, our comments here are without prejudice to other measures that apply to other sources—both inside and outside the nonattainment area, 40 C.F.R. § 51.1312(c)—and that merit TCEQ's careful consideration, particularly measures adopted and recommended by other agencies like the South Coast Air Quality Management District and Ozone Transport Commission. Again, TCEQ's existing regulatory framework has repeatedly proven itself inadequate to result in timely attainment, and thus must be strengthened.

Importantly, TCEQ must adopt RACT as part of RACM, meaning that the 2019 comments' RACT analysis also applies here.[13] Thus, TCEQ cannot rely reflexively on EPA's badly outdated CTG and ACT documents, but must instead rationally analyze whether improvements are indeed "reasonably available."[14]

The largest single NOx source in the nonattainment area is the W.A. Parish station.[15] The W.A. Parish gas-fired units have higher NOx emission rates than the coal-fired units; TCEQ must consider improved control measures, such as SCR, at the gas-fired units, for those units have only over-fire air as NOx controls.[16] As for the coal-fired units, though they are equipped with SCR, their performance has deteriorated over time, meaning that TCEQ must consider a requirement for properly maintaining and operating the SCR system (including replacing catalysts), a quick and efficient means of reducing emissions.[17]

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[13] *See* 83 Fed. Reg. 62,998, 63,007 (Dec. 6, 2018) ("EPA interprets the RACM provision to require a demonstration that an air agency has adopted all reasonable measures (including RACT) to meet RFP requirements and to demonstrate attainment as expeditiously as practicable").

[14] *Id.* at 63,007-08 ("EPA requires that air agencies consider all available measures, including those being implemented in other areas").

[15] 2019 Technical Comments 14.

[16] *Id.* at 14-15, 16-17 tbl.3.

[17] *Id.* at 15-17 & tbl.3.

Three refineries and chemical plants, in particular, account for the area's substantial NOx and VOC emissions.[18] At these sources, NOx emissions result from fuel combustion units, and to perform a rational RACM analysis, TCEQ must identify NOx emission rates for these units, existing controls, and emission rates with better technically feasible controls.[19] Depending on the source type, controls that TCEQ must consider for refineries across the board are—for boilers, heaters, and furnaces— "a combination of ultra-low NOx burners/FGR/SNCR or ultra-low NOx burners/SCR," and, for turbines, "dry low NOx combustors followed by SCR."[20] For VOCs, large amounts of emissions are fugitive.[21] TCEQ must consider, for cooling towers, "enhanced surveillance to ensure that no hydrocarbons leak into cooling water (i.e., via better maintenance, or proactive replacement of equipment)," and for valves, pumps, and the like, improved leak identification and repair measures, relying on, for example, optical gas imaging and other similar leak detection mechanisms.[22]

For VOC emissions from flares—another significant source of VOC emissions[23]—TCEQ must consider requiring alternatives to flaring or, if flaring remains necessary, improved flare efficiency. Further, as malfunction events too often result in massive emissions of ozone-forming precursors, TCEQ must consider requiring more effective, and proactive, maintenance as a control measure to reduce the frequency and severity of malfunction events.

Finally, for VOC emissions from storage tanks at refineries, TCEQ must consider requiring vapor pressure products above a particular threshold vapor pressure to "be stored in internal floating roof or fixed roof tanks – connected to a vapor recovery or vapor control system with a specified (and verifiable) capture and/or control efficiency of at least 99%," such as carbon absorbers and concentrators and/or catalytic or regenerative thermal oxidizers.[24]

<u>RACM for the Dallas-Fort Worth Nonattainment Area</u>

For more than 50 years the Dallas-Fort Worth ("DFW") area has consistently failed to meet maximum ozone air quality standards designed to protect human

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[18] *Id.* at 17.
[19] *Id.*
[20] *Id.* at 18.
[21] *Id.*
[22] *Id.*
[23] *Id.* at 19 tbl.4
[24] *Id.* at 20 & n.22.

health and welfare.[25] 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.

Residents of the DFW area are consistently exposed to some of the highest ozone levels in the central United States. In fact, the American Lung Association lists 3 Texas cities on the top 20 list of highest "high ozone days" in the United States with Dallas-Fort Worth at number 17.[26] Recent epidemiological studies demonstrate that even modest reductions in ozone in the DFW area would save hundreds of millions in avoided medical costs and mortalities.[27]

In 2015, and again in 2016, we submitted to TCEQ extensive comments on the agency's proposed Attainment Demonstration SIP for the DFW area, which we summarize and attach for your convenience. As explained in those comments, to satisfy RACM and ensure attainment of the ozone NAAQS in the DFW area "as expeditiously as practicable," as required by the Clean Air Act,[28] TCEQ must adopt NOx emission limits for the East Texas coal fired power plants, Big Brown, Limestone, Martin Lake, Monticello, and Welsh.[29] Although the Big Brown and Monticello power plants have since retired, the Martin Lake, Limestone, and Welsh plants are among the nation's largest emitters of NOx pollution. According to EPA's

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[25] Indeed, on August 13, 2019, the EPA reclassified the 10-county DFW area from moderate to serious nonattainment under the 2008 ozone standard. *See* https://www.tceq.texas.gov/airquality/sip/dfw/dfw-status.

[26] https://www.lung.org/research/sota/city-rankings/most-polluted-cities

[27] *See* Ex. 5, (Robert Haley and Martha Carvour, *Health Effects Prevented by a 5 ppb drop in Ozone Levels* (Division of Epidemiology, Department of Internal Medicine, University of Texas Southwestern Medical Center 2015)). *See also* ISA (2013) and U.S. Environmental Protection Agency, Policy Assessment for the Review of the Ozone National Ambient Air Quality Standards, Second External Review Draft (2013); Bell et al., The Exposure-Response Curve for Ozone and Risk of Mortality and Adequacy of Current Ozone Regulations, Environ Health Perspect. 114:532-536 (2006), *available at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1440776/; Salam et al., 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 (2005), http://dx.doi.org/10.1289/ehp.8111.

[28] 42 U.S.C. § 7502(c)(1).

[29] *See, e.g.*, Sierra Club, Downwinders at Risk, and Center for Biological Diversity Comments Regarding EPA's Proposed Approval and Promulgation of Implementation Plans; Texas; Attainment Demonstration for the Dallas/Fort Worth 2008 Ozone Nonattainment Area at 2, 35, 83 Fed. Reg. 19,483 (May 3, 2018), EPA Docket No. EPA–R06–OAR–2016–0476; FRL–9977–01–Region 6.

Air Markets Database, in 2019, the coal-burning, three-unit Martin Lake power plant in Rusk County was the seventh largest source of NOx emissions in the country for a combined total of 9,489 tons.[30] The nearby Limestone facility was the 22nd largest source of NOx pollution in the nation, emitting 7,470 tons in 2019. In fact, the state of Texas as a whole released more NOx than any other state, with a combined total of 95,617 tons.[31]

As explained in our 2015 and 2016 comments, there is no dispute that the East Texas coal plants contribute to ozone nonattainment in the DFW area, and that TCEQ's focus on emission reductions within the DFW area is insufficient to achieve attainment. TCEQ's own 2015 Attainment Demonstration SIP demonstrates that the non-DFW, East Texas coal plants are the largest or second largest anthropogenic contributor to nonattainment at the stubbornly violating Denton air quality monitor.[32] Indeed, but for the contribution from those coal plants, the Denton Airport monitor would not be in violation of the NAAQS.[33]

And as EPA observed in its 2015 comments on revisions to the DFW Attainment Demonstration, TCEQ's *own* "background and transport analyses show that efforts focused solely on controlling local emissions may be insufficient to bring the DFW area into ozone attainment given that, on many days, background estimates are well over half the eight-hour ozone NAAQS of 75 ppb."[34] EPA then concluded that TCEQ's own discussion of the formation, background levels, and transport of ozone "strongly supports the implementation of controls on NOx sources located to the east and southeast of the DFW nonattainment area," and explicitly requested that TCEQ reevaluate the benefits to the DFW area associated with reducing NOx emission "from utility electric generators in just the counties closest to the eastern and southern boundaries of the DFW area.[35]

TCEQ refused to conduct any such analysis, but researchers at the University of North Texas ("UNT") Engineering Department did. In a 2015 study,

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30 EPA, Air Markets Program Data. *See* https://ampd.epa.gov//ampd/.
31 *Id.*
32 Dallas-Fort Worth (DFW) 2008 Eight-Hour Ozone Nonattainment Area Attainment Demonstration (AD) State Implementation Plan (SIP) Revision at 3-72 to 3-75, SIP Project No. 2013-015-SIP-NR [hereinafter, "AD SIP"].
33 *Id*. at 3-75.
34 Ex. 6, EPA, Comments Re: Revisions to Dallas-Fort Worth Attainment Demonstration for the 2008 Eight-Hour Ozone Nonattainment Area, Project Number 2013-015-SIP-NR (Feb. 11, 2015) [hereinafter, "EPA Comments DFW AD SIP"]).
35 *Id.* In its January 2016 comments to TCEQ, EPA again emphasized the need for greater upwind NOx reductions to meet attainment. *See* EPA Jan. 2016 Comments DFW AD SIP at 3.

the UNT Engineering Department cloned the State's DFW computer air model used for the DFW SIP and ran control scenarios the State had not.[36] The UNT model demonstrates that approximately 38% of the pollution contributing to the DFW region's high ozone levels comes from point sources outside the 10-county nonattainment area, but within Texas state lines. Within that 38% of smog-forming pollution outside DFW, but within Texas, the East Texas coal plants represent the largest percentage by far in any source category. Sources within the 10-county area accounted for 32% of the projected 2025 DFW design value, while other states accounted for only 17%.

The UNT study also evaluated control scenarios the State failed to examine.[37] Using TCEQ own inputs, the UNT model makes clear that no other single control option improves DFW ozone levels as significantly as reducing NOx pollution from the East Texas coal plants.

90% NOx reduction from the coal-fired EGUs

Maximum absolute difference of 8hr-mean O_3 predicted in 3x3 cells nearby CAMS (Scenario – FY18)

CAMS	Scenario A 67-day episode
Kaufman - C71	6.5
Dallas Hinton St. - C401	5.7
Arlington - C61	5.7
Grapevine - C70	5.7
Greenville - C1006	5.5
Dallas Exec. Airport - C402	5.3
Itally/Ellis - C650	5.3
Midlothian OFW - C52	5.3
Rockwall - C69	4.9
Midlothian Tower - C94	4.9
Dallas North - C63	4.7
Denton Airport South - C56	4.6
Keller-C17	4.5
Frisco - C31	4.4
Cleburne Airport - C77	4.4
Granbury - C73	4.1
Pilot Point - C1032	4.0
Ft. Worth Northwest-C13	3.7
Parker County - C76	3.6
Eagle Mt. Lake - C75	3.4

Figure—Effect of 90% NOx Reduction From the Coal-Fired EGUs

As indicated in the figure above, a 90% reduction in NOx emissions from the five East Texas coal plants results in ozone reductions of at least 3 ppb at *all* 20

[36] Ex. 7, Drs. Mahdi Ahmadi and Kuruvilla John, North Texas Ozone Attainment Initiative Project, (Nov. 2015),
at http://dfwozonestudy.org/.

[37] *Id.* TCEQ has this modeling in its possession because the UNT modeling is a clone of TCEQ's modeling from the DFW nonattainment area.

DFW monitoring sites, and more than 4 ppb improvement at the notoriously failing Denton monitor.[38] As indicated in the figure below, eliminating NOx emissions at those five coal plants, yields even greater benefits across the DFW nonattainment area. The UNT modeling demonstrates that 90% NOx emission reductions from the East Texas coal plants would result in 3.4 to 6.5 ppb improvements in monitored ozone levels across the DFW area—nearly enough, by itself, to bring the area into attainment.[39]

Change in Relative Response Factor (using the 10 highest days) and projected design value

CAMS	2006 DV_B (ppb)	TCEQ Projection		Scenario G	
		FY18 RRF	FY18 DV_F	Scenario RRF	Scenario DV_F
Ft. Worth Northwest-C13	89.33	0.8209	73.3	0.8067	72.1
Keller-C17	91.00	0.8169	74.3	0.8050	73.3
Frisco - C31	87.67	0.8266	72.5	0.8159	71.5
Midlothian OFW - C52	77.00	0.8255	63.6	0.8038	61.9
Denton Airport South - C56	93.33	0.8127	75.8	0.8009	74.8
Arlington - C61	83.33	0.8260	68.8	0.8114	67.6
Dallas North - C63	85.00	0.8365	71.1	0.8268	70.3
Rockwall - C69	77.67	0.8436	65.5	0.8320	64.6
Grapevine - C70	90.67	0.8196	74.3	0.8086	73.3
Kaufman - C71	74.67	0.8522	63.6	0.8297	62.0
Granbury - C73	83.00	0.8146	67.6	0.7971	66.2
Eagle Mt. Lake - C75	93.33	0.8061	75.2	0.7960	74.3
Parker County - C76	87.67	0.8250	72.3	0.8136	71.3
Cleburne Airport - C77	85.00	0.8187	69.6	0.7938	67.5
Midlothian Tower - C94	80.50	0.8246	66.4	0.8031	64.7
Dallas Hinton St. - C401	81.67	0.8294	67.7	0.8173	66.7
Dallas Exec. Airport - C402	85.00	0.8322	70.7	0.8207	69.8
Greenville - C1006	75.00	0.8335	62.5	0.8204	61.5
Pilot Point - C1032	81.00	0.8140	65.9	0.8038	65.1

Under 40 C.F.R. § 51.1312(c), TCEQ plainly has the flexibility—indeed, the obligation—to require NOx reductions from the East Texas coal plants if appropriate and necessary to ensure attainment with the NAAQS in the DFW area. Specifically, 85-90% of NOx reductions could be achieved with the installation of selective catalytic reduction ("SCR") technology, which is both cost-effective and technically feasible.[40]

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[38] *See* http://dfwozonestudy.org/contact/coal-plants/.

[39] Scenario G in the figure below includes a 90% NOx reduction from all three Midlothian kilns, 90% reduction of NOx from the coal plants, and 50% reduction in NOx from the 647 large compressors counted as point sources in the 10 County area. The separate runs in Scenario RRF and DVF represent both episodes the State has chosen; June-July and August-September. The numbers in the tables are maximum drops at each of the 20 DFW monitoring sites.

[40] *Id.*; *see also* Sierra Club and Downwinders at Risk Comments Re: Commission Approval for Proposed Dallas-Fort Worth (DFW) 2008 Eight-Hour Ozone

Alternatively, as explained in our comments, TCEQ could immediately impose a mass-based emission limitation on ozone season NOx emissions from the East Texas coal plants, based on reduced operations, and ratchet that limitation up over time. In practice, this could be implemented by requiring a 40% reduction from the 2015 ozone season average uncontrolled tons per day rate, as soon as reasonably feasible.[41] TCEQ could then increase the NOx emission limit to a 60% reduction, commencing a year after the previous increase; and a final limit based on an 80% reduction commencing a year after the second increase. The 80% reduction is based on TCEQ's statements that SCR can achieve 80% reduction. The fact that SCR can actually achieve 90% reduction will provide the power plant owners additional flexibility in complying with this emission limit.

Compliance with a mass-based NOx emission limit could be implemented almost immediately, and could ensure the DFW area's compliance with the ozone NAAQS far more expeditiously, more economically, and more equitably than under the agency's historic do-nothing approach.[42] Such an approach would fall within TCEQ's interpretation of RACM as including only measures that can advance attainment by at least one year.

In its 2015 Attainment Demonstration SIP, TCEQ refused to consider either of those potential RACM measures on the ground that the agency's modeling predicted attainment of the 2008 NAAQS by 2021, and that reducing NOx emissions from the East Texas coal plants would not advance attainment by at least a year. It is now clear, however, that the DFW area will not attain the 2008—to say nothing of the 2015—NAAQS in 2021,[43] and therefore that excuse is no longer available.

As with the HGB nonattainment area, TCEQ's existing regulatory framework has repeatedly proven itself inadequate to achieve attainment of the ozone NAAQS in the DFW area. Indeed, the DFW area has never timely compiled with any of EPA's standards for ozone pollution, and air quality in the area far exceeds the

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Nonattainment Area Attainment Demonstration (AD) State Implementation Plan (SIP) Revision at 40, SIP Project No. 2013-015-SIP-NR [hereinafter, "2015 Comments"]. Highest

41 By "uncontrolled" we mean excluding reductions that were achieved by SNCR but not excluding reductions which were achieve by combustion controls such as low NOx burns or overfired area.

42 2016 Comments at 37.

43 As seen in TCEQ's own form the fourth highest value for several monitors has already exceeded the NAAQS based on data from June and July of 2021. https://www.tceq.texas.gov/cgi-bin/compliance/monops/8hr_4highest.pl; EPA, 2020 Design Value Reports for Ozone, https://www.epa.gov/air-trends/air-quality-design-values#report.

ozone levels current scientific research dictates as necessary to protect human health.[44] Moreover, as discussed in more detail below and in our 2015 and 2016 comments, there is no dispute that the East Texas coal plants contribute significantly to ozone nonattainment in the DFW area and that even modest reductions in NOx emissions from those facilities would provide for attainment of the ozone NAAQS in the DFW area. Thus, it is both necessary and appropriate for TCEQ to consider requiring RACM of out-of-area sources, like the East Texas coal plants, "to provide for attainment of the applicable ozone NAAQS" within the DFW area.[45]

Other states have taken a similar approach. Georgia, for example, has imposed a mass-based emission limit on coal fired power plants outside of the Metro-Atlanta ozone nonattainment area.[46] In fact, TCEQ itself has recognized its authority to limit emissions from sources outside the DFW nonattainment area to further compliance with the NAAQS. Indeed, TCEQ lists Utility Electric Generation in East and Central Texas, 30 TAC Chapter 117, Subchapter E, Division 1 as one of the existing measures to control ozone in the DFW nonattainment area.[47] TCEQ also lists the East Texas Combustion Sources Rule, 30 TAC Chapter 117, Subchapter E, Division 4 as another measure and explains: "Measure implemented to reduce ozone in the DFW nonattainment area although controls not applicable in the DFW nonattainment area[.]"[48]

Controlling NOx from the East Texas coal plants would not only advance attainment of the ozone standard by at least a year, and could be implemented expeditiously, but it would further compliance with numerous other requirements of the Clean Air Act. EPA's regulations encourage a multi-pollutant approach.[49] Creating new emission limits for the East Texas coal plants will not only help satisfy RACM for the 2008 and 2015 ozone NAAQS, it will also help TCEQ and Texas to comply with numerous other environmental protection measures. Thus, one rulemaking process establishing emission limits for the East Texas coal plants would help satisfy numerous obligations under the Clean Air Act, including Texas' obligation under the 2008 ozone NAAQS Good Neighbor provision, its still-unfulfilled obligations under the Regional Haze program, and its intra- and inter-state obligations under 2015 NAAQS.

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[44] https://www.airlaw4all.com/wp-content/uploads/2021/02/Comments-on-EPA%E2%80%93R06%E2%80%93OAR%E2%80%932020%E2%80%930161.pdf and 2016 comments

[45] 40 C.F.R. § 51.1312(c).

[46] *See* Ex. 8, at 4, Condition 3.2.3.

[47] AD SIP 4-2.

[48] AD SIP 4-3. – at 26

[49] 80 Fed. Reg. 12,264; *see also* 42 U.S.C. § 7410(a)(2)(D)(i)(I).

Sierra Club and Earthjustice appreciate the opportunity to submit these comments on ideas for potential reasonably available control measures in the DFW and HGB areas. We look forward to continuing to engage with TCEQ on these issues and would welcome the opportunity to discuss these comments. Please do not hesitate to contact us if you have any questions or need any additional information.

VIA HTTPS://WWW6.TCEQ.TEXAS.GOV/RULES/ECOMMENTS/

Andreea Vasile
Texas Commission on Environmental Quality
Office of Legal Services, MC-205
P.O. Box 13087
Austin, Texas 78711-3087

March 16, 2021

RE: Sierra Club Amended Comments, Commission Approval for Proposed Rulemaking Chapter 115, Control of Air Pollution from Volatile Organic Compounds VOC RACT Rules for Oil and Natural Gas CTG Rule, Project No. 2020-038-115-AI

To whom it may concern,

On behalf of its nearly 30,000 members in Texas—including thousands of members and supporters who live, work, and recreate in the 18 Dallas-Fort Worth, Houston, and San Antonio counties where the air is already unhealthy to breathe due, in part, to pollution from oil and gas sources—Sierra Club submits these comments on the Texas Commission on Environmental Quality's ("TCEQ's") Proposed Rulemaking under Chapter 115, Control of Air Pollution from Volatile Organic Compounds ("VOC"), Reasonably Available Control Technology ("RACT") Rules for Oil and Natural Gas Control Techniques Guidelines ("CTG"), Project No. 2020-038-115-AI.

Ozone pollution in the DFW, Houston, and San Antonio areas is dangerous to children, seniors, people with lung ailments, and many others. The DFW and HGB areas, which together span 18 counties, are each designated as being in "serious" nonattainment with the 2008 National Ambient Air Quality Standard ("NAAQS") for ozone pollution, meaning that air quality is currently unhealthy to breathe for the approximately 14 million Texans who live, work, and recreate in the greater Dallas-Fort Worth and Houston areas. 84 Fed. Reg. 44,238 (Sept. 23, 2019). Under the Clean Air Act, the deadline for the DFW and HGB nonattainment areas to come into compliance with the 2008 ozone NAAQS is July 20, 2021, *id.*, but there is little reason to believe Texas will meet that deadline. Indeed, Texas has consistently failed to fulfill the Clean Air Act's basic objectives for more than 45 years, as the

Dallas-Fort Worth area has never actually attained the public health and welfare-based NAAQS.

Air quality in the Permian Basin, the heart of the Texas oil & gas fracking boom, is likewise unsafe to breathe. Air quality monitoring in the El Paso area indicates that the area is not meeting the 2015 health-based National Air Quality Standard for ozone.

With that in mind, TCEQ's proposed RACT Rules for Oil and Natural Gas sources in the Dallas-Fort Worth and Houston-Galveston-Brazoria ("HGB") presents an opportunity to reduce VOC pollution from oil and gas sources and increase monitoring from those sources, and therefore improve air quality in both the Houston and DFW areas. In light of the long history of ozone nonattainment in DFW and HGB, TCEQ should implement robust and protective RACT rules for VOC emissions from oil and gas sources that help bring those areas into attainment as expeditiously as practicable.

As discussed more fully below, we urge TCEQ to strengthen several provisions of the proposed rulemaking and ensure that it is more protective from both public health and climate perspectives. Specifically, we urge TCEQ to:

- Revisit the production threshold in the proposed rule that would limit applicability of the rule's leak detection and repair ("LDAR") requirements to only those well sites with a well that produces, on average, greater than 15 barrels of oil equivalent per day. Proposal at 25 (Proposed §115.172(a)(8)). Over 99% of conventional wells reporting production fall below this threshold and would therefore be exempted from this rule's LDAR requirements.

- Eliminate the provision that allows well site operators to reduce the frequency of LDAR inspections if the percentage of leaking components identified on-site is less than 2% for two consecutive quarterly inspections. Research shows that large, uncontrolled leaks are random and can only be detected with frequent and regular inspections. We provide further recommendations on other provisions of the proposed rulemaking to deliver additional emission reductions and ensure consistency of control requirements for all Pennsylvania operators and sources in the oil and gas sector.

- In light of the Clean Air Act's mandate to implement "all reasonably available control measures" as necessary to attain the NAAQS "as expeditiously as practicable," 42 U.S.C. § 7502, we strongly believe TCEQ should applying the RACT regulations to oil and gas sources throughout Texas, which not only contribute to nonattainment in the DFW and Houston areas, but also contribute to monitored ozone exceedances in the San Antonio, El Paso, and Midland-Odessa areas. At a minimum, TCEQ must implement the oil and gas RACT rules in the San Antonio area, which fails to meet the 2015 ozone standard and will be automatically redesignated as being in moderate nonattainment in 2021.

- There is an urgent need to control methane and other harmful pollutants from oil and gas sources in Texas. A recent study using satellite observations and atmospheric inverse modeling reveals that methane emissions from the Permian Basin region, one of the largest oil-producing regions in the world are more than two times higher than the federal government's previous estimates. Overall, Texas oil and gas development activities result in approximately 60% greater leakage rates than other areas of the country, due primarily to extensive venting and flaring.

I. BACKGROUND

A. Ground-Level Ozone Is Dangerous to Human Health.

Residents of the DFW and Houston nonattainment areas are consistently exposed to some of the highest ozone levels in the Central United States. Indeed, air quality monitors in the area consistently exceed the ozone levels current scientific research dictates as necessary to protect human health—especially for sensitive populations such as children, asthmatics, and the elderly. In fact, the HGB area consistently ranks as one of the most polluted cities in the country for ozone.[1] Texas's own monitoring data indicates that the area is on track to continue violating the 2008 standard, with numerous exceedances of healthy air quality levels at several monitors throughout the DFW and Houston areas.[2] And those exceedances are likely to continue into the core period of the ozone season.

Scientific research continues to strengthen our understanding of the harm that ozone causes to public health. Exposure to ozone is connected to a wide range of significant human health impacts including respiratory and cardiovascular harms, premature deaths, perinatal and reproductive impacts, and central nervous system and developmental harms. Serious health impacts have been demonstrated through controlled human exposure, epidemiologic, and toxicological studies.[3] The physiological impacts of ozone exposure are experienced even by healthy individuals

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[1] http://www.lung.org/our-initiatives/healthy-air/sota/city-rankings/most-polluted-cities.html

[2] TCEQ's data demonstrates that the fourth-highest ozone reading at least three monitors in the HGB area have already exceeded the standard, with several other monitors reflecting ozone levels as high as 88 ppb. *See* https://www.tceq.texas.gov/cgi-bin/compliance/monops/8hr_4highest.pl.

[3] *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)"].

and even at relatively low concentrations of ozone. Moreover, there is a growing body of scientific evidence showing that repeated exposure over time causes additional health impacts, which may be more severe and less likely to be reversible.

Ozone exposure has also been linked to the exacerbation of asthma, as well as development of the disease. For individuals already diagnosed with asthma, evidence shows that ozone exposure increases the likelihood of having an asthma attack.[4] 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.[5]

Additionally, certain "sensitive" groups and individuals are found to have significantly greater susceptibility to ozone-related health impacts. 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."[6] Other health impacts linked to ozone exposure are related to newborns and the developing fetus.[7] Prenatal exposure to ozone has been linked to reduced birth weight, premature delivery, and birth defects.[8]

Texas's failing air quality has serious and well-documented health consequences for the approximately 14 million Texans that live in the DFW and Houston areas, where EPA has deemed the air quality unsafe to breathe.[9] Indeed, in the Dallas-Fort Worth area, 14% of adults have asthma—the highest asthma

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[4] *See, e.g.*, Franze et al., Protein nitration by polluted air, Enviro Sci Technol. 39: 1673-1678 (2005), http://dx.doi.org/10.1021/es0488737; .U.S. Environmental Protection Agency, Air quality criteria for ozone and related photochemical oxidants [EPA Report], (EPA/600/R-05/004AF) (2006), http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=149923.
[5] Akinbami, The association between childhood asthma prevalence and monitored air pollutants in metropolitan areas, United States 2001-2004 (Environ Res. Apr. 2010), 110(3):294-301, http://dx.doi.org/10.1016/j.envres.2010.01.001.
[6] Bell et al., The Exposure-Response Curve for Ozone and Risk of Mortality and Adequacy of Current Ozone Regulations, Environ Health Perspect. 114:532-536 (2006), *available at* http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1440776/.
[7] ISA (2013) at 2-20.
[8] Salam et al., 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 (2005), http://dx.doi.org/10.1289/ehp.8111.
[9] http://quickfacts.census.gov/qfd/maps/texas_map.html.

prevalence in adults in Texas.[10] 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.[11] 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 in Texas had asthma.[12]

Children, the elderly, minorities, and low income households are especially sensitive to ground-level smog, and often bear a disproportionate asthma burden. 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. And Figure 5 below, Black Texans are nearly 2.5 times more likely to die from asthma than white Texans.[13]

B. Oil and Gas Sources Are a Significant Contributor to Texas's Unhealthy Air.

Texas's oil and gas sources are significant contributors to unhealthy air in the DFW and Houston areas. The Clean Air Task Force modeled health impacts from ozone precursor emissions from oil and gas sources on populations in Texas. These impacts include more than 144,000 asthma attacks per year, over 105,000 lost school days, and over 283,000 lost work days, when adults need to rest or reduce their activity because of high ozone levels. [14] And according to the National Emissions Inventory, over 8,500 tons of hazardous toxic air pollution—benzene, formaldehyde, and acetaldehyde—are emitted annually by oil and gas facilities in

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[10] Texas Dep't of State Health Services, 2014 Texas Asthma Burden Report at 7, *available at* https://www.dshs.state.tx.us/asthma/pdf/2014BurdenRpt.doc ("2014 Texas Asthma Report"). Texas no long publishes its annual asthma burden report, so the 2014 data is the most current.

[11] 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.

[12] 2014 Texas Asthma Burden Report, https://www.dshs.state.tx.us/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=8589994855.

[13] *Id*. at 20.

[14] L. Fleischman *et al.*, "Gasping for Breath: An analysis of the health impact from ozone pollution from the oil and gas industry," available at: https://www.catf.us/resource/gasping-for-breath/.

Texas;[15] the volume of benzene, formaldehyde, and acetaldehyde emissions from oil and gas operations is expected to grow as a result of significant increases in oil production and natural gas production. Based on those projection, the Clean Air Task Force estimates that 82 counties in Texas will face elevated cancer risk due to toxic emissions from oil and gas operations.[16]

Reductions in VOC pollution from oil and gas sources would therefore bring about significant health benefits Texans. Importantly, downwind states would also see significant benefits from reductions in VOC pollution from our oil and gas sector. The Clean Air Task Force found that residents in downwind states, such as Oklahoma, experience tens of thousands of asthma attacks per year from oil and gas industry pollution. Some of those impacts are likely exacerbated by Texas oil and gas activities, indicating that it is appropriate for Texas to reduce VOC pollution from this industry as part of its obligations under the Clean Air Act.

In addition to securing much-needed reductions of VOCs and other harmful air pollutants from oil and gas sources, the proposed rulemaking will help reduce emissions that contribute to methane, the primary component of natural gas and a powerful climate pollutant that is 36 times more potent than carbon dioxide on a 100-year timeframe and 87 times more potent on a 20-year timeframe.[17] Approximately one-quarter of the anthropogenic climate change we are experiencing today is attributable to methane.[18] Leaky, outdated, and

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[15] US EPA. 2011 National Air Toxic Assessment. Available at: https://www.epa.gov/national-air-toxics-assessment/2011- national-air-toxics-assessment.

[16] L. Fleischman *et al*, Fossil Fumes: A public health analysis of toxic air pollution from the oil and gas industry (Clean Air Task Force 2016), https://www.catf.us/wp-content/uploads/2016/06/CATF_Pub_FossilFumes.pdf

[17] Int'l Panel on Climate Change (IPCC), *Climate Change 2013: The Physical Science Basis, Contribution of Working Group I to the Fifth Assessment Report* (Thomas Stocker et al., eds. 2013), Chapter 8- Natural and Anthropogenic and Natural Radiative Forcing, at 714 https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf; Bradbury et al., Dep't of Energy, Office of Energy Policy and Systems Analysis, *Greenhouse Gas Emissions and Fuel Use within the Natural Gas Supply Chain – Sankey Diagram Methodology* (July 2015), at 10, https://www.energy.gov/sites/prod/files/2015/07/f24/QER%20Analysis%20-%20Fuel%20Use%20and%20GHG%20Emissions%20from%20the%20Natural%20Gas%20Syst em%2C%20Sankey%20Diagram%20Methodology_0.pdf (explaining how the effects of oxidation increase the IPCC's global warming potential values for methane to 87 over a 20-year timeframe an 36 over a 100-year timeframe).

[18] IPCC, *Climate Change 2013: The Physical Science Basis, Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate*

malfunctioning equipment at oil and gas sites constitute a primary source of industrial methane emissions, and the requirements finalized in this rulemaking must help materially reduce harmful emissions from existing facilities. Most of these facilities are operating today without the protections afforded either by the U.S. Environmental Protection Agency's ("EPA") 2016 New Source Performance Standards.[19]

C. Reducing Ozone Levels Would Result in Significant Public Health and Economic Benefits.

Recent epidemiological studies demonstrate that modest reductions in ozone in the DFW and Houston areas would save hundreds of millions in avoided medical costs and mortalities. Specifically, a 2015 epidemiological study conducted by the University of Texas-Southwestern on behalf of the Dallas County Medical Society provides a Dallas-Fort Worth specific estimate of the public health and economic costs of an additional five parts per billion ozone in the region's air shed.[20] Using the EPA-approved Environmental Benefits Mapping and Analysis Program ("BenMAP"), the health impacts and economic benefits associated with a 5 ppb reduction in ozone, as well as attainment of EPA's recently promulgated 70 ppb NAAQS. A 5 ppb reduction in ozone levels would avoid approximately 97 premature deaths *each year* in the 34-county area of Northeast Texas.[21] Half of those avoided mortalities would occur in Tarrant (Ft. Worth) and Dallas Counties (City of Dallas). A 5 ppb drop in ozone levels would also prevent over 200 hospital admissions, 400 emergency room visits, over 170,000 days of restricted activity for all residents, and almost 140,000 lost school days *each and every year*, thereby avoiding approximately $650 million in lost economic productivity each year. Dr. Haley's study demonstrates the large public health and financial gains available to North Texas in return for decreasing ozone levels.

Reductions in pollution from oil and gas sources would not only result in significant reduction in harmful greenhouse gases, sulfur dioxide ("SO_2"), nitrogen oxides ("NOx"), and particulate matter 2.5 ("$PM_{2.5}$") pollution, but the corresponding increase in renewable energy generation to replace that fossil fuel generation

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Change (Thomas Stocker et al., eds. 2013) (calculation based on Chapter 8), https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_all_final.pdf; *see also* Drew T. Shindell et al., Improved Attribution of Climate Forcing to Emissions, 326 SCIENCE 716, 717 (2009).

[19] *Oil and Natural Gas Emission Standards for New, Reconstructed, and Modified Sources*, 81 Fed. Reg. 35,824 (June 3, 2016) (codified at 40 C.F.R. pt., 60, subpt. OOOOa).

[20] Robert Haley and Martha Carvour, *Health Effects Prevented by a 5 ppb drop in Ozone Levels* (Division of Epidemiology, Department of Internal Medicine, University of Texas Southwestern Medical Center 2015.

[21] *Id*. at 12.

(which is already occurring) will result in the creation of thousands of jobs and save millions in Texas energy costs. Although more robust RACT regulations for oil and gas sources may displace some fossil-fuel electric generation, that would be offset by increased renewable energy generation. Thus, stronger RACT regulations will not only result in significant reductions of ozone, methane, and other toxic air pollutants, but would stimulate economic development, job creation, and reduce electricity prices.[22]

II. COMMENTS ON THE PROPOSED RULE

A. TCEQ Should Make Leak Detection and Repair Improvements to the Rule.

TCEQ's proposed control requirements for fugitive emissions components establish a baseline quarterly inspection frequency with one of three types of leak detection methods: optical gas imaging ("OGI"), a gas leak detector that meets the requirements of Method 21, or another device approved by DEP.[23] Operators must adhere to detailed requirements to ensure their leak detection devices are operating properly, retain detailed records of each inspection, tag or retain digital photographs of each component on the delayed repair list, and submit records in annual reports. The proposed rulemaking further allows well site operators to reduce the inspection frequency to semi-annual if the percentage of leaking components is less than 2% for two consecutive inspections.[24] The inspection frequency reverts to quarterly if at any time the percentage of leaking components is higher than 2%.

We support TCEQ's proposal to require a quarterly LDAR program at oil and gas facilities, especially a baseline quarterly inspection requirement for applicable well sites. A number of leading states already require quarterly inspections. Analyses prepared by such states, as well as by independent consulting groups and leading operators, demonstrate that quarterly inspections are cost-effective. In addition, numerous scientific studies demonstrate that equipment and components can fail or operate abnormally on unpredictable schedules and across facility and equipment types. Such events can contribute to significant emissions, far in excess of estimates that rely on emission factors. A study in the Barnett Shale found leaks

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[22] A recent National Renewable Energy Laboratory study evaluating the costs and benefits of renewable portfolio standards concludes that decreased fossil fuel generation and corresponding increases in renewable energy generation yield significant societal and economic benefits. *See* Wiser et al., A Retrospective Analysis of the Benefits and Impacts of U.S. Renewable Portfolio Standards (NREL Jan. 2016) (Technical Report No. TP-6A20-65005), *available at* http://www.nrel.gov/docs/fy16osti/65005.pdf.

[23] Proposed Rule at 64, 172 (Proposed 30 TAC §§ 115.177(b)(4); 115.179(e))

[24] Proposed Rule at 174 (Proposed 30 TAC §§ 115.177(b)(8)(B))

to be over 50% greater than estimated in EPA's national GHG inventory. This and many other studies relying on direct measurement underscore the critical need for operators to frequently inspect facilities for abnormal operating conditions, repair any such conditions expeditiously, and document and report the results of inspections. Furthermore, robust, detailed recordkeeping and reporting requirements are critical to compliance monitoring and enforcement. They also provide important information on the efficacy of LDAR programs.

Although we support quarterly inspections, we offer below suggestions on improving the strength and protectiveness of the LDAR provisions in the proposed rulemaking. Specifically, we urge TCEQ to:

(1) **Remove the production threshold that would limit applicability of the LDAR requirements to only those well sites with a well that produces, on average, greater than 15 barrels of oil equivalent per day ("low-producing well exemption"),** Proposed 30 TAC §115.172(a)(8).

(2) **Remove the provision that allows well operators to decrease the inspection frequency to semi-annual based on the percentage of leaking components,** Proposed 30 TAC §115.177(b)(4)&(8)**; and**

(3) **Expand the definition of fugitive emissions components to include continuous- and intermittent-bleed pneumatic devices.** Proposed 30 TAC §115.171(4).

The scientific consensus, based on numerous studies involving direct measurement of oil and gas leaks, demonstrates the heterogeneous, unpredictable, and ever-shifting nature of equipment leaks. These characteristics strongly point toward the need for frequent inspections to identify and repair leaking components and equipment. Specifically:

- **Leaks are Heterogeneously Distributed.** There is considerable evidence that emissions from equipment leaks are heterogeneously distributed—with a small percentage of sources accounting for a large portion of emissions[25]—

[25] Allen, D.T., *et al.*, (2013) "Measurements of methane emissions at natural gas production sites in the United States," *Proc. Natl. Acad.*, **110**, ("Allen (2013)"), *available at* http://www.pnas.org/content/110/44/17768.full; ERG and Sage Environmental Consulting, LP, "City of Fort Worth Natural Gas Air Quality Study, Final Report" ("Fort Worth Study") (July 13, 2011), *available at* http://fortworthtexas.gov/gaswells/default.aspx?id=87074 (finding that the highest 20 percent of emitting sites account for 60–80 percent of total emissions from all sites; the lowest 50 percent of sites account for only 3–10 percent of total emissions); Zavala-Araiza, *et al.*, (2015) "Toward a Functional Definition of Methane Super-

and that existing inventories do not accurately reflect the presence of these "super-emitters."[26]A series of studies in the Barnett Shale region in Texas—incorporating both top-down and bottom-up measurement—found that emissions were 50 percent greater than estimates based on the GHGI.[27] One study in particular found that a small number of sources are responsible for a disproportionate amount of emissions, noting specifically that "sites with high proportional loss rates have excess emissions resulting from abnormal or otherwise avoidable operating conditions, such as improperly functioning equipment."[28] The concentration of emissions within a relatively small proportion of sources has been observed both among groups of components within a site and among groups of entire facilities.[29]

- **Equipment Leaks are Unpredictable**. A number of studies have assessed whether well characteristics and configurations can predict super-emitters, concluding that they are only weakly related, and that these emissions are largely stochastic.[30] In particular, the Barnett coordinated campaign

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Emitters: Application to Natural Gas Production Sites," *Environ. Sci. Technol.*, 49, at 8167−8174 ("Zavala-Araiza (2015)"), *available at* http://pubs.acs.org/doi/pdfplus/10.1021/acs.est.5b00133 (finding that "functional super-emitter" sites represented approximately 15% of sites within each of several different "cohorts" based on production, but accounted for approximately 58 to 80% of emissions within each production cohort); Zavala-Araiza et al., (2015) "Reconciling divergent estimates of oil and gas methane emissions," Proceedings of the National Academy of Sciences, vol. 112, no. 51, 15597 at 15600 (finding that "at any one time, 2% of facilities in the Barnett region are responsible for 90% of emissions, and 10% are responsible for 90% of emissions.") ("Barnett Synthesis").

[26] *Id*. at 15599.

[27] Harriss, *et al.*, (2015) "Using Multi-Scale Measurements to Improve Methane Emissions Estimates from Oil and Gas Operations in the Barnett Shale, Texas: Campaign Summary," *Environ. Sci. Technol.*, **49**, ("Harriss (2015)"), *available at* http://pubs.acs.org/doi/abs/10.1021/acs.est.5b02305http://pubs.acs.org/doi/abs/10.1021/acs.est.5b02305http://pubs.acs.org/doi/abs/10.1021/acs.est.5b02305 (providing a summary of the 12 studies that were part of the coordinated campaign).

[28] Zavala-Araiza (2015), at 8167−8174.

[29] *See* EPA, "Oil and Natural Gas Sector Leaks: Report for Oil and Natural Gas Sector Leaks" (2014), *available at* http://www3.epa.gov/airquality/oilandgas/2014papers/20140415leaks.pdf.

[30] Lyon, *et al.*, (2015), "Constructing a Spatially Resolved Methane Emission Inventory for the Barnett Shale Region," *Environ. Sci. Technol.*, **49**, at 8147-57, *available at* http://pubs.acs.org/doi/pdf/10.1021/es506359c; *See also* Brantley, H.L., *et. al.*, "Assessment of methane emissions from oil and gas production pads using mobile measurements," Environmental Science & Technology, 48(24), pp.14508-

mentioned above found that abnormal operating conditions, such as improperly functioning equipment could occur at different points in time across facilities.[31] As a result, Zavala-Araiza, *et al.* reported that inspections need "to be conducted on an ongoing basis" and "across the entire population of production sites."[32] In addition, a recent helicopter study of 8,220 well pads in seven basins, including 2,067 well pads in the southwest Pennsylvania region of the Marcellus Basin, confirms that leaks occur randomly and are not well correlated with characteristics of well pads, such as age, production type or well count.[33] That study focused only on very high-emitting sources, given the helicopter survey detection limit which ranged from 35–105 metric tons per year (tpy) of methane. The paper reported that emissions exceeding the high detection limits were found at 327 sites. Ninety-two percent of the emission sources identified were associated with tanks, including some tanks with control devices that were not functioning properly and so could be expected to be addressed through an LDAR program. While the study did not characterize the individually smaller but collectively significant leaks that fell below the detection limit, it nonetheless confirms that high-emitting leaks occur at a significant number of production sites and that total emissions from such leaks are very likely underestimated in official inventories.

- **Super-Emitters Shift in Time and Space**. Abnormal operating conditions, such as improperly functioning equipment, can occur at different points in time across facilities.[34] While it is true that, at any one time, roughly 90% of emissions come from 10% of sites, these sites shift over time and space—meaning that, at a future time, a different 10% of sources could be responsible for the majority of emissions.[35]

14515, *available at* http://pubs.acs.org/doi/abs/10.1021/es503070q (assessing where well characteristics can predict emissions, concluding that they are weakly related and that emissions are largely stochastic); Zavala-Araiza (2015) ("large number of facilities in the Barnett region cause high emitters to always be present, and these high-emitters seem to be spatially and temporally dynamic. . . .To reduce those emissions requires operators to quickly find and fix problems that are always present at the basin scale but that appear to occur at only a subset of sites at any one time, and move from place to place over time.").

[31] Harriss (2015).

[32] Zavala-Araiza (2015).

[33] Lyon, et al., "Aerial Surveys of Elevated Hydrocarbon Emissions from Oil and Gas Production Sites," *Environ. Sci. Technol.*, 2016, *50* (9), pp 4877–4886, available at
http://pubs.acs.org/doi/abs/10.1021/acs.est.6b00705.

[34] Barnett Synthesis at 15600.

[35] *Id.*

Other studies confirm these findings[36] and underscore the importance of frequent inspections to identify and repair stochastic, heterogeneous leaks. A new study continues to show that more frequent LDAR surveys are important to maintain the benefits of emissions reductions.[37] This study assessed the effectiveness of LDAR with repeat optical gas imaging ("OGI") surveys at Alberta natural gas facilities. After one survey, total methane emissions were reduced by *44 percent*, demonstrating the effectiveness of LDAR for mitigating emissions. Over 90 percent of detected leaks were effectively repaired by the second survey, but fugitive emissions only decreased 22 percent due to the development of new leaks. Consequently, LDAR is highly effective at finding and fixing individual leaks, but repeat, frequent surveys are necessary to maintain low emissions.

Other states also have successful LDAR programs in place requiring frequent inspections for existing oil and gas sites. California requires quarterly LDAR at all production sites and compressor stations statewide,[38] and Wyoming requires quarterly LDAR at all new and existing well sites in the Upper Green River Basin with the potential to emit 4 tpy VOC from fugitive components.[39] In both states, operators may use Method 21, an OGI instrument, or another approved instrument.

Colorado has required LDAR at existing oil and gas facilities since 2014. For well sites with potential emissions above 12 tpy VOC, Colorado requires quarterly instrumental inspection; if potential emissions exceed 50 tpy VOC, *monthly* inspection is required.[40] Additionally, any site with potential emissions over 2 tpy

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[36] Allen, D.T. et al., "Methane Emissions from Process Equipment at Natural Gas Production Sites in the United States: Liquid Unloadings," *Environ. Sci. Technol.*, (2015), 49 (1), pp 641–648, available at http://pubs.acs.org/doi/abs/10.1021/es504016r; Mitchell, A.L., et al, (2015) "Measurements of Methane Emissions from Natural Gas Gathering Facilities and Processing Plants," *Environ. Sci. Technol*, 2015, 49 (5), pp 3219–3227, available at http://pubs.acs.org/doi/abs/10.1021/es5052809; R. Subramanian, et al, (2015) "Methane Emissions from Natural Gas Compressor Stations in the Transmission and Storage Sector: Measurements and Comparisons with the EPA Greenhouse Gas Reporting Program Protocol," *Environ. Sci. Technol*, available at http://pubs.acs.org/doi/abs/10.1021/es5060258.

[37] Ravikumar, et al., Repeated Leak Detection and Repair Surveys Reduce Methane Emissions Over Scale of Years, 15:3 Envtl. Research Letters (Feb. 26, 2020).

[38] CARB § 95668(g).

[39] WY Permitting Guidance; Wyoming Department of Environmental Quality, Air Quality Division Standards and Regulations, Nonattainment Area Regulations, Ch. 8, Sec. 6.

[40] Colorado 5 C.C.R. 1001-9, Regulation No. 7, § D.II.E.4.

VOC that is within 1,000 feet of an occupied area must be inspected quarterly.[41] Notably, when Colorado first required LDAR in 2014, the state estimated that over 3,000 well production facilities would be subject to quarterly or monthly instrumental inspection;[42] the number of Colorado facilities subject to quarterly or more frequent LDAR today is now considerably higher.[43]

Since 2014, Colorado has twice strengthened its LDAR program with rulemakings in 2017 and 2019. In both cases, building upon the effectiveness of the program in reducing emissions, the state increased the required instrumental inspection frequency at many sites that had been subject to less frequent LDAR under the initial rules.

Beyond Colorado's requirement for monthly inspections, leading operators and independent analysis also support a monthly inspection frequency for the largest well sites and compressor stations.

- **Jonah Energy**. Jonah Energy operates in the Upper Green River Basin in Wyoming. Jonah Energy's Enhanced Direct Inspection & Maintenance ("EDI&M") Program in Wyoming has been ongoing for the past decade and includes a monthly LDAR program using instrument-based surveys (i.e., OGI). According to Jonah, this program significantly reduces pollution while paying for its own costs: "[b]ased on a market value of natural gas of $4/MMBtu, the estimated gas savings from the repair of leaks identified exceeded the labor and material cost of repairing the identified leaks."[44] Jonah has reported that this highly cost-effective LDAR program has reduced fugitive VOC emissions from its facilities by over 75%, indicating that methane and other hydrocarbon losses have also been reduced by a similar proportion.[45] Jonah's experience that gas savings from repairs often exceed its LDAR program's costs is also borne out by the Carbon Limits

[41] *Id.*
[42] Colorado Air Pollution Control Division, Cost-Benefit Analysis for Proposed Revisions to AQCC Regulations No. 3 and 7 (Feb. 7, 2014) Table 27, on file with CAC.
[43] In addition to growth of the industry that has occurred in Colorado since 2014, the 2014 rules did not require quarterly LDAR at sites with potential VOC emissions of 2-12 tpy located less than 1,000 feet from an occupied area (this requirement was added in 2019).
[44] Comments submitted to Mr. Steven A. Dietrich from Jonah Energy LLC on Proposed Regulation WAQSR, Chapter 8, Nonattainment Area Regulations, Section 6, Upper Green River Basin Existing Source Regulations (Dec. 10, 2014).
[45] Jonah Energy, Presentation at WCCA Spring Meeting at 16 (May 8, 2015).

report[46] discussed below and analysis carried out by Colorado.[47] There is mounting industry-supplied evidence that frequent LDAR is cost-effective.[48]

- **Carbon Limits**. A study conducted by Carbon Limits on behalf of Clean Air Task Force determined that monthly surveys of well sites and gas plants have VOC abatement costs of under $3,500 per metric ton.[49]

B. TCEQ Should Remove the Low-Producing Well Exemption.

The proposed rulemaking currently applies LDAR requirements only to those well sites with a well that produces, on average, greater than 15 barrels of oil equivalent per day.[50] This production threshold was adopted from EPA's recommendations in the 2016 Control Techniques Guidelines for the Oil and Natural Gas Industry (2016 O&G CTG) as constituting RACT.[51] The 2016 O&G CTG, however, did not determine that sites with low-producing wells do not emit significant emissions through equipment leaks; rather, it simply declined "at this time . . . to include a RACT recommendation" for those well sites. As such, EPA "encourage[d] air agencies to consider site specific data from these sources in their RACT analyses."[52]

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[46] Carbon Limits, *Quantifying Cost-effectiveness of Systematic Leak Detection and Repair Programs Using Infrared Cameras*, 16 (Mar. 2014) ("Carbon Limits 2014"), *available at* http://www.catf.us/resources/publications/files/Carbon_Limits_LDAR.pdf.

[47] Colorado Air Pollution Control Division used an entirely different method than Carbon Limits to predict that almost 80 percent of repair costs for well facilities will be covered by the value of conserved gas. *See* CAPCD Cost-Benefit, at Table 30.

[48] Several companies that engaged in the development of Colorado's regulations provided evidence that frequent LDAR is cost-effective. In particular, Noble estimated the cost-effectiveness of Colorado's tiered program at "between approximately $50/ton and $380/ton VOC removed" at well production facilities. (Rebuttal Statement of Noble Energy, Inc. and Anadarko Petroleum Corporation in the Matter of Proposed Revisions to Regulation Number 3, Parts A, B, and C, Regulation Number 6, part A, and Regulation Number 7 Before the Colorado Air Quality Control Commission, at 7).

[49] Carbon Limits, Fact Sheet, Fixing the Leaks: What would it cost to clean up natural gas leaks?, available at http://www.catf.us/resources/factsheets/files/LDAR_Fact_Sheet.pdf.

[50] Proposed 30 TAC §115.172(a)(8).

[51] *See* 81 FR 74798 (October 27, 2016).

[52] Control Techniques Guidelines for the Oil and Natural Gas Industry 2016 at 9-38, https://www.epa.gov/sites/production/files/2016-10/documents/2016-ctg-oil-and-gas.pdf.

Despite EPA's directive, TCEQ's proposal does not present adequate site-specific data or analysis or supporting materials on either the costs or emission reduction benefits associated with implementing LDAR programs for low-producing wells. Given the sheer volume of Texas's wells that would be exempted from applicable LDAR requirements using this production threshold, we strongly urge DEP to remove this low-producing well exemption from the proposed rulemaking.

From a climate perspective, all wells require routine, comprehensive inspections, regardless of production levels. If TCEQ insists on providing some form of exemption for low-producing wells, it must not extend that beyond those operators that own only a single marginal or stripper well. To the extent that there are concerns associated with robust LDAR requirements in unique circumstances, TCEQ could allow individually affected operators to apply for a variance pursuant to established criteria; but a blanket exemption from any routine inspections for tens of thousands of wells is not supported by the science or the record. TCEQ should remove this applicability threshold from the rule to ensure that emission leaks are quickly identified and repaired at all wells.

C. TCEQ Should Remove the Reduced Frequency Step-Down Provision.

TCEQ's proposal also creates perverse incentives by rewarding operators for failing to identify harmful leaks. This is not a hypothetical concern. A 2007 report by EPA found "significant widespread non-compliance with [LDAR] regulations" at petroleum refineries and other facilities subject to variable-frequency inspection requirements.[53] EPA observed: "Experience has shown that poor monitoring rather than good performance has allowed facilities to take advantage of the less frequent monitoring provisions."[54] The report recommends that "[t]o ensure that leaks are still being identified in a timely manner and that previously unidentified leaks are not worsening over time," companies should monitor more frequently.[55] TCEQ should establish a rigorous and fixed baseline that incentivizes operators to find leaks more quickly and accurately—maximizing environmental benefits while minimizing costs.

Furthermore, TCEQ's proposed metric for determining adjusted frequency—the percentage of leaking components—is not an accurate predictor of a facility's emissions performance. At a conceptual level, if emissions from leaking components were homogenously distributed, the percentage of components leaking at a facility

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[53] EPA, "Leak Detection and Repair: A Best Practice Guide," October 2007, at 1, *available at* http://www2.epa.gov/sites/production/files/2014-02/documents/ldarguide.pdf.
[54] *Id.*
[55] *Id.*

would be a good indicator of facility-level emissions. However, there is overwhelming evidence that leak emissions follow a skewed, highly-heterogeneous distribution, with a relatively small number of sources accounting for a large portion of emissions. In such circumstances, the percentage of leaking components will not accurately reflect emissions and should not be used to determine the frequency of LDAR survey requirements.

To demonstrate this as an empirical matter, we examined the effects of percent thresholds using data from the City of Fort Worth Study Air Quality Study, which includes both component level emissions information and site-level data. Figure 1 below shows the results of this analysis, and compares site-level emissions to the percentage of leaking components and demonstrates that the individual sites with the highest emissions fall below TCEQ's proposed 2 percent threshold. Figure 2 aggregates site-level emissions at each of these thresholds. Sites with fewer than 2 percent leaking components constituted 90% of total emissions and 80% of all sites.

Figure 1: Site Methane Emissions (lb per year) Versus Percent Leaking Components

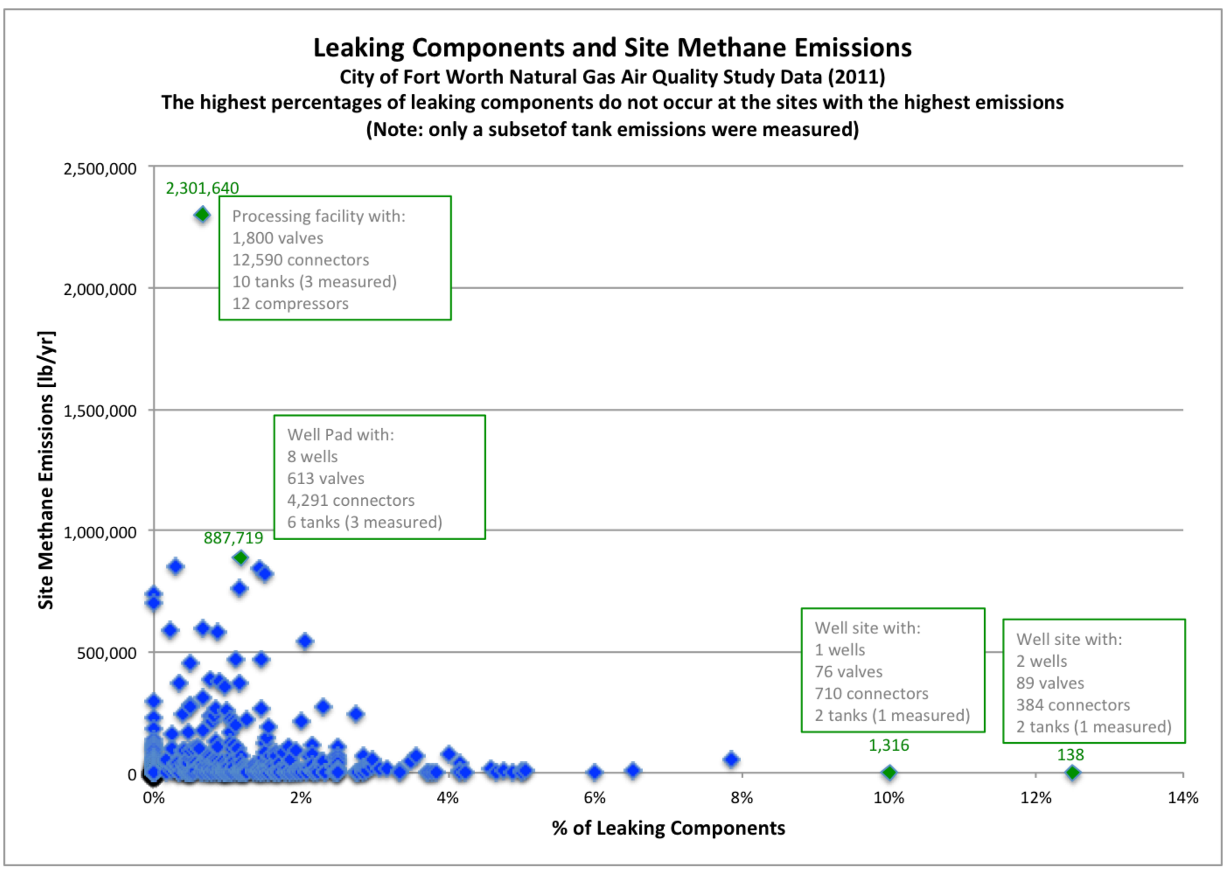
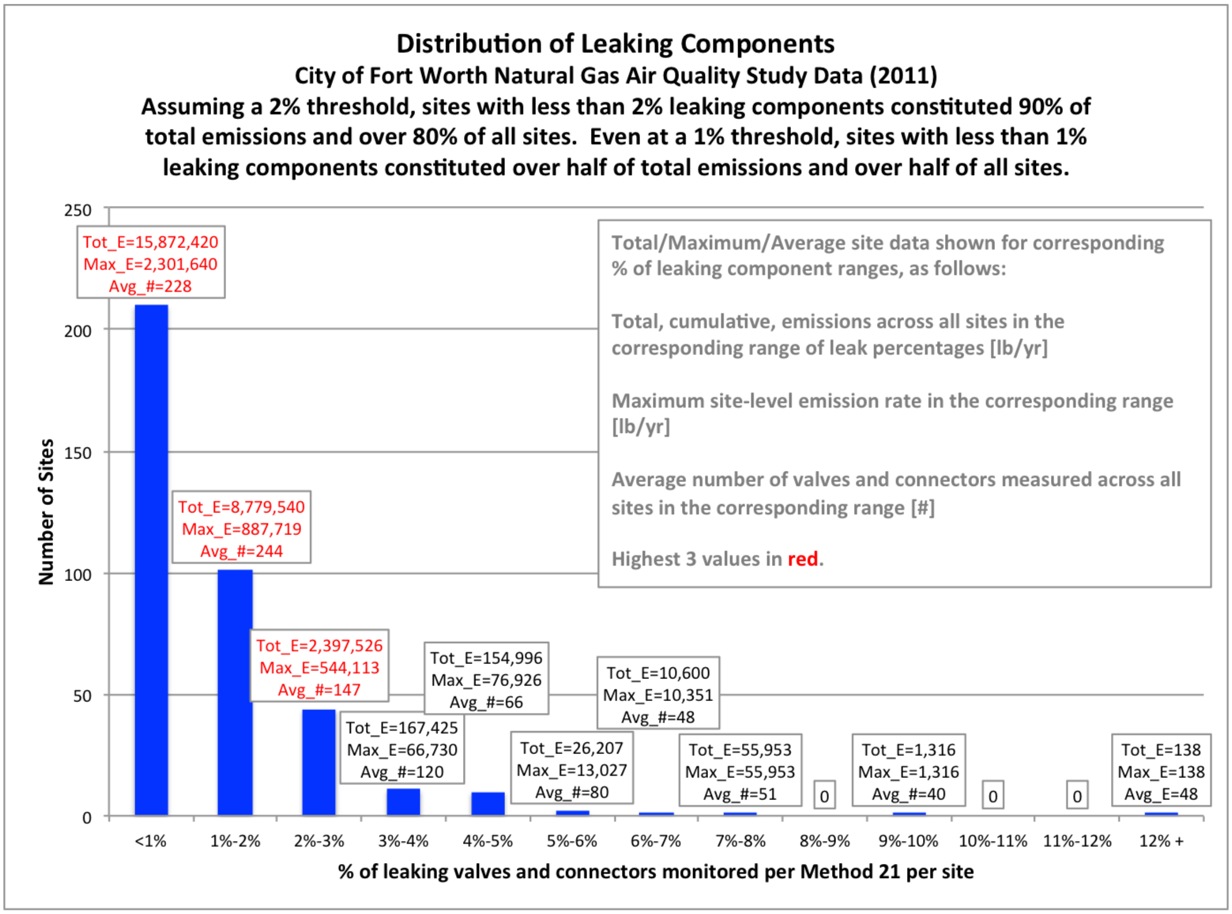


Figure 2: Number of Sites versus Percent of Leaking Valves and Connectors Monitored per Site (Method 21)



Additionally, several recent studies have shown that a majority of emissions come from a very small number of leaking components or "super-emitters."[56] For example, only about 1% of total components were found emitting using EPA's Method 21 approach, and only about 0.2% were found emitting using OGI cameras.[57] Even sites with high total emissions will likely have fewer than 2% of components leaking at any point. Independent operator data show that while the largest reductions in VOC emissions occur in the first year of an LDAR program,

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[56] A.R. Brandt et al. (2016). Methane Leaks from Natural Gas Systems Follow Extreme Distributions. *Environ. Sci. Technol.* **50** 12512. https://pubs.acs.org/doi/abs/10.1021/acs.est.6b04303.
[57] A.P. Ravikumar et al. (2017). Designing better methane mitigation policies: the challenge of distributed small sources in the natural gas sector. Environ. Res. Lett. 12 044023. https://iopscience.iop.org/article/10.1088/1748-9326/aa6791/meta.

significant emission reductions are still achieved in subsequent years – because leaks re-occur at facilities.[58]

This pattern was independently confirmed in supplementary analysis carried out by Carbon Limits on leak inspection data from a number of well production facilities and compressor stations.[59] Carbon Limits found that inspectors continued to find leaks in repeat inspections at the same facility. Additionally, Carbon Limits found that, at facilities in Alberta subject to LDAR requirements, the cost-effectiveness of the leak inspections (expressed in dollars per metric ton of VOC abatement) did not significantly rise over several years after regulations were put in place.

We urge TCEQ to remove provisions allowing operators to reduce inspection frequency based on the percentage of leaking components identified in prior surveys. Using any metric, past emissions are not a good predictor of future emissions, given the prominent role that improperly functioning equipment, poorly maintained equipment, and other random events play in overall emissions.

D. LDAR should apply to all sources of unintentional venting, including continuous- and intermittent-bleed controllers.

We urge DEP to expand the scope of the LDAR program to apply the definition of "fugitive emissions component" to all sources of unintentional venting, including continuous- and intermittent-bleed pneumatic devices.[60] A series of studies demonstrates that both types of controllers can have significant emissions when malfunctioning. Specifically:

- **Allen *et al* (2015).** As part of the Phase II UT study, an expert review of the controllers with highest emissions rates concluded that some of the high emissions were caused by reparable issues, and that "many of the devices in the high emitting group were behaving in a manner inconsistent with the manufacturer's design."[61] For example, some devices not designed to bleed

[58] *Id*. at 10-11.
[59] Colorado Department of Public Health and Environment, Index of /apc/aqcc/Oil & Gas 021914-022314/REBUTTAL STATEMENTS, EXHIBITS & ALT PROPOSAL REVISIONS/Conservation Group. Supplemental Testimony of David McCabe, at 734-736, *available at* ftp://ft.dphe.state.co.us/apc/aqcc/Oil%20&%20Gas%20021914-022314/REBUTTAL%20STATEMENTS,%20EXHIBITS%20&%20ALT%20PROPOSAL%20REVISIONS/Conservation%20Group/Conservation%20Groups%20-%20REB%20Exhibits.pdf.
[60] Proposed 30 TAC §115.171(4).
[61] David T. Allen et al., *Methane Emissions from Process Equipment at Natural Gas Production Sites in the United States: Pneumatic Controllers*, 49 Envtl. Sci. & Tech. 633-640 (2014), http://pubs.acs.org/doi/pdf/10.1021/es5040156.

continuously (e.g., intermittent-bleed devices) had continuous emissions, which according to the study authors, "could be the result of a defect in the system, such as a crack or hole in the end-device's (control valve's) diaphragm actuator, or a defect in the controller itself, such as fouling or wear."[62] Analysis of the study data indicates that average emissions from malfunctioning intermittent devices were almost 40 times higher than average emissions from normally operating intermittent pneumatics.

- **Allen *et al.* (2013)**. This study reported that at 5.1 standard cubic feet per hour (scfh), emissions from low-bleed pneumatic controllers were 270% higher than EPA's emissions factor for these devices.[63] Many low-bleed controllers are specified by their manufacturers to emit far less than this: EPA's Natural Gas STAR program has documented many low-bleed controller models with bleed rates of less than 3 scfh and, of course, the emissions factor used by EPA for low-bleeds (1.39 scfh)[64] implies that many low-bleeds are expected to emit at a very low level. Assuming that some low-bleed controllers are performing as specified, the high emission rate observed by Allen *et al.* (2013) implies that many "low-bleed pneumatic controllers" are in fact emitting more than the legally applicable threshold of 6 scfh for low-bleeds—often much more—simply to raise the average emission rate to 5.1 scfh.

- **City of Fort Worth Study.** The Fort Worth Study examined emissions from 489 intermittent-bleed pneumatic controllers using IR cameras, Method 21, and a HiFlow sampler for quantification. The study found that many of these controllers were emitting constantly and at very high rates, even though the devices were being used to operate separator dump valves and were not designed to emit in between actuations.[65] Average emission rates for the controllers in the Fort Worth Study were at a rate approaching the average emissions of a high-bleed pneumatic controller. According to the study authors, these emissions were frequently the result of improperly functioning or failed controllers.[66]

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[62] *Id*. at 639.
[63] Allen, *et al*. (2013), *supra* note 25, at 17,771-72.
[64] 40 C.F.R. § 98.233(a).
[65] Fort Worth Study, *supra* note 25
[66] *Id*. at 3-99 to 3-100. ("Under normal operation a pneumatic valve controller is designed to release a small amount of natural gas to the atmosphere during each unloading event. Due to contaminants in the natural gas stream, however, these controllers eventually fail (often within six months of installation) and begin leaking natural gas continually.").

- **British Columbia Study.** The Prasino study of pneumatic controller emissions in British Columbia also noted the potential for maintenance issues leading to abnormally high bleed rates.[67] Although the researchers did not identify a cause for these unexpectedly high emission rates, the results are consistent with the observation that maintenance and operational issues can lead to high emissions and reflect similar empirical outcomes to the studies discussed above, which did link high bleed rates to improperly functioning devices.
- • **The Carbon Limits Study.** The Carbon Limits Report confirms these findings and concludes that LDAR programs may help to identify other improperly functioning devices like pneumatic controllers.[68]

More recent studies have similarly found that pneumatic controllers frequently malfunction or operate improperly, leading to excess emissions. Luck *et al*. studied 72 controllers at 16 natural gas compressor stations, finding that 42% of these controllers were operating abnormally, with substantially higher emissions than normally-operating controllers.[69] Stovern *et al.* inspected 500 gas-emitting pneumatic controllers at 31 well production sites in Colorado's Denver-Julesberg basin and found maintenance issues frequently occurred in this large sample.[70] For example, they found that intermittent-bleed controllers made up 83% of the sample and over 11% of these devices were (improperly) continuously emitting.

In light of these findings, TCEQ must extend the proposal's LDAR requirements to include both continuous- and intermittent-bleed controllers. These standards would be highly cost-effective. For instance, the incremental cost of checking intermittent-bleed controllers for continuous emissions during an LDAR inspection is very low, since the inspector is already on site – in most cases the

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[67] The Prasino Group, *Determining bleed rates for pneumatic devices in British Columbia; Final Report*, (Dec. 18, 2013), at 19, *available at* http://www2.gov.bc.ca/assets/gov/environment/climate-change/stakeholder-support/reporting-regulation/pneumatic-devices/prasino_pneumatic_ghg_ef_final_report.pdf. ("Certain controllers can have abnormally high bleed rates due to operations and maintenance; however, these bleed rates are representative of real world conditions and therefore were included in the analysis.").

[68] Carbon Limits (2014), *supra* note 35 at 12.

[69] Benjamin Luck *et al.*, *Multiday Measurements of Pneumatic Controller Emissions Reveal the Frequency of Abnormal Emissions Behavior at Natural Gas Gathering Stations*, 6 Envtl. Sci. & Tech. Lett. 348, 352 (2019), https://pubs.acs.org/doi/10.1021/acs.estlett.9b00158.

[70] Michael Stovern *et al.*, *Understanding oil and gas pneumatic controllers in the Denver-Julesburg basin using optical gas imaging,* 70 *J. Air & Waste Mgmt. Assn.* 468, 489 (2020), https://doi.org/10.1080/10962247.2020.1735576.

device will not be actuating and the incremental cost of inspecting one more component is very small. Although this approach would not address a major source of emissions—devices that simply have high emissions when functioning properly—it would reduce emissions from improperly functioning intermittent-bleed controllers with minimal additional burdens on operators that are already inspecting facilities where such devices are located.

Direct measurement of emissions from continuous-bleed controllers during LDAR inspections has a small incremental cost—it is more time consuming than checking intermittent-bleed controllers between actuations and it may require the use of instruments that the inspectors are not routinely using. Nevertheless, such measurements are commonly performed during LDAR inspection and would only modestly increase the expense of these surveys.

From a technical standpoint, LDAR requirements for pneumatic devices are easily achievable. The same methods used for leak detection at valves, connectors, and other leaking components and equipment at oil and gas facilities can be used to spot significant operational issues at pneumatic controllers. This is particularly true of intermittent-bleed controllers, where an OGI survey revealing continuous emissions from an intermittent controller can alert operators to the problem. Similar to a protocol for detecting leaks from components never expected to have emissions, intermittent-bleed controllers should be observed for visible emissions including the control box or other vents that normally emit during actuations. If emissions are observed, then a controller should continue to be observed for a period sufficient to determine if the controller is actuating (approximately one to two minutes).

California has already established LDAR requirements for both continuous- and intermittent-bleed devices. On March 23, 2017, the California Air Resources Board (CARB) finalized standards regulating greenhouse gas emissions from oil and gas operations, which require inspection of intermittent-bleed pneumatic controllers for continuous emissions during LDAR inspections.[71] These standards require quarterly LDAR inspections of oil and gas wellpads and compressor stations,68 and require checking all intermittent-bleed pneumatic controllers for improper continuous emissions during each inspection.[72] Controllers improperly emitting between actuation must be repaired. In addition, operators of any existing continuous-bleed controller (all of which must be low-bleed) must directly measure

[71] Cal. Air Res. Bd., *CARB Approves Rule for Monitoring and Repairing Methane Leaks from Oil and Gas Facilities* (Mar. 23, 2017), www.arb.ca.gov/newsrel/newsrelease.php?id=907.
[72] Cal. Code Regs. tit. 17, § 95669(a), (g), www.arb.ca.gov/regact/2016/oilandgas2016/oilgasfro.pdf.

emissions from those controllers on an annual basis, and repair or replace any controller emitting more than 6 scf per hour.

Colorado also has in place a specific program for operators to perform an instrumental inspection of all pneumatic controllers. The inspections must be carried out with the same frequency as LDAR inspections (that is, the frequency depends on potential VOC emissions from the site), so effectively pneumatics are inspected whenever operators must inspect a facility for leaks. This program was first required at sites in the Denver-Front Range ozone non-attainment area, where oil and gas activity is most intense in Colorado, in 2017.[73] Recognizing the effectiveness of this program in reducing emissions, the program was expanded statewide in 2019.72 Note that *all* pneumatic controllers – including "low-bleed" and "intermittent-bleed" controllers – are covered during every inspection.

Using these two state programs as examples, TCEQ should require operators to inspect any controller venting natural gas to the atmosphere to decrease the harmful excess emissions that these devices so often produce. Every device should be inspected with OGI or similar instruments, and operators should confirm that any continuous bleed device is emitting less than 6 scfh with a direct measurement.

E. TCEQ Must Broadly Require Use of Zero-Emission Technology for Both Intermittent- and Continuous-Bleed Pneumatic Controllers.

We urge TCEQ to include both intermittent- and continuous-bleed pneumatic controllers among the equipment that operators must cover in their LDAR inspections. This will ensure that improperly functioning devices are located and repaired on a regular basis. In addition, we also urge TCEQ to issue standards for these sources that broadly require the use of zero-emitting technology.

Emissions from continuous-bleed pneumatic controllers, even those designed to be "low-bleed," can be substantial. The proposed rulemaking requires controllers to be "low-bleed," (i.e., have a bleed rate of less than or equal to 6 scfh) at most facilities and zero-bleed, if installed at a natural gas processing plant.[74] Although low-bleed controllers are superior to high-bleed controllers, they often do not function as designed or otherwise emit more than designed: a significant number of controllers designated as low- bleed by operators or manufacturers have been observed to actually emit above the 6 scfh threshold. Improperly functioning devices may result in substantial emissions.

By omitting intermittent controllers, TCEQ's proposed rulemaking will fail to address the vast majority of harmful VOC emissions from pneumatic

[73] Colorado 5 C.C.R. 1001-9, Regulation No. 7, § D.III.F.2.a.
[74] Proposed 30 TAC §115.174(b)(1).

controllers in the state. These controllers frequently have high emissions for two reasons. First, they are designed to vent natural gas while actuating, and some controllers actuate very frequently. For example, of the 377 pneumatic controllers (both continuous-bleed and intermittent-bleed) studied by Allen *et al.* (2014), 24 actuated at least 10 times during the sampling period, which was typically 15 minutes. Four actuated over 50 times while being sampled.[75] These devices can emit at high levels—five of the 40 highest-emitting devices in the Allen *et al*. sample were intermittent-bleed devices that the researchers assessed to be operating properly. These controllers emitted up to 40 scfh of whole gas during the sampling interval. Second, as described above, intermittent-bleed pneumatic controllers frequently do not operate as designed and emit natural gas continuously, not just when actuating. This creates an additional stream of emissions beyond that resulting from normal operations. More recent studies of pneumatic controllers at compressor stations and well production sites in Colorado also found that these devices frequently operate improperly, leading to excess emissions.[76]

Meanwhile, cost-effective technologies are available to eliminate emissions from continuous-bleed and intermittent-bleed pneumatic controllers and pneumatic pumps. An August 2016 study by Carbon Limits shows that cost-effective zero-bleed options exist for both new and existing pneumatic devices, and these options have been proven to work robustly in upstream oil and gas operations.[77] Specifically, Carbon Limits performed a comprehensive literature review and conducted 17 in-depth interviews with technology providers, as well as small and large oil and gas companies. This allowed Carbon Limits to compile up-to-date information on field experience with the implementation of zero-emission technologies, their applicability, and their costs. The zero-emission options Carbon Limits examined included:

- Using compressed "instrument air" instead of natural gas to drive pneumatic controllers.

- Using electronic control systems and electric valve actuators instead of pneumatic controllers and valve actuators for valve automation. This

[75] *See* David T. Allen, et al., *Methane Emissions from Process Equipment at Natural Gas Production Sites in the United States: Pneumatic Controllers – Supporting Information* 10–19 & tbl. S4-1 (2014), http://pubs.acs.org/doi/suppl/10.1021/es5040156.
[76] Stovern *et al*. 2020.
[77] Carbon Limits, *Zero Emission Technologies for Pneumatic Controllers in the USA: Applicability and Cost Effectiveness* (Aug. 1, 2016), http://catf.us/resources/publications/files/Zero_Emitting_Pneumatic_Alternatives.pdf (Carbon Limits).

approach can be used both at sites where electricity is already available and at sites without grid power by installing solar-powered systems.

- Pneumatic controllers that do not release gas to the atmosphere, but rather release gas to a pressurized gas line. These are typically referred to as "bleed-to-pressure" or "integral" controllers.

- Capturing gas released from pneumatic controllers using vapor recovery units, or routing gas that would otherwise have been emitted to fuel lines on site.[78]

Carbon Limits found that mature, reliable, and low-cost technologies are available in almost all situations to replace venting pneumatic equipment.[79] The study demonstrates that for almost any configuration of oil and gas facilities, at least one of these technologies is an available, feasible, and low-cost means of emissions abatement as compared to unmitigated natural gas-driven pneumatic controllers. In particular, both solar- and grid-powered electronic controllers and instrument air technology are in wide use today and readily available in the market. Carbon Limits accordingly concluded that "[o]verall . . . zero-emission solutions are available today and are cost-effective to implement in nearly every situation."[80]

Costs are lower for existing sites because older controllers are higher-emitting (especially continuous-bleed controllers, which may be high-bleed if they predate EPA's NSPS Subpart OOOO rule). An existing dry-gas facility with one continuous-bleed pneumatic controller and five intermittent-bleed pneumatic controllers (based on median wells drilled in Pennsylvania in 2016) would have an abatement cost of $781 per short ton of VOC abatement and $272 per metric

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[78] *Id.* at 12–13. One additional last resort option that Carbon Limits did not examine is routing gas that would be vented from controllers to a control device—an incinerator or flare. Of course, it should be noted that the zero- emission options discussed by Carbon Limits are always superior to incineration or flaring where any one of them is feasible, and incineration or flaring should only be used as an emission control method when no other options (apart from venting) are available.
[79] *Id.* at 12. Carbon Limits reports that instrument air is applicable at larger sites (roughly 20 or more controllers on site) when power is available from the grid or from an on-site generator. *See id.* at 23. It also reports that electric controllers are applicable at sites of all sizes if power is available, and, in combination with solar power, applicable at smaller sites (20 or fewer controllers) when power is not otherwise available. *See id.* However, Carbon Limits reports that there is no technical barrier to the use of electric controllers with solar panels at larger sites; there is simply little known precedent of this type of installation. *See id.* at 16.
[80] *Id.* at 4.

ton of methane abatement.[81] To place this in context, the federal Interagency Working Group valued the social benefit of reducing one ton of methane as ranging from $520 to $3,200, with a "central" value of $1,200.[82]

Furthermore, these cost estimates were made using conservative assumptions. Costs will be even lower for large sites with many controllers, sites that have pneumatic pumps, and at sites that have electrical power available. The calculations are also conservative because they consider only the cost of abating a single pollutant at a time (methane *or* VOC) even though utilizing instrument air or electric controllers would simultaneously reduce emissions of both pollutants. A multi-pollutant approach would demonstrate lower costs per ton of either pollutant reduced.

Recognizing the importance of moving to zero-bleed solutions as a means to eliminate harmful pollution from venting pneumatic controllers, two Canadian provinces with significant oil and gas production have finalized regulations that will sharply curtail the use of *any type of pneumatic controller* (high-bleed, low-bleed, and intermittent-bleed) which vents to the atmosphere. In British Columbia, all new facilities – including wellpads and compressor stations—cannot

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[81] Assuming $2/mcf gas, and emissions factors of 14.4 scfh for continuous-bleed controllers and 4.4 scfh for intermittent controllers. Costs were derived from interviews with oil and gas producers, system and component suppliers, and online quotes from component suppliers.

[82] Interagency Working Group on Social Cost of Greenhouse Gases, Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide, 7 (Table 1) (Aug. 2016), https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/august_2016_sc_ch4_sc_n2o_addendum_final_8_26_16.pdf. Although they likely underreport the true cost that greenhouse gas emissions pose to society, the Interagency Working Group's estimates of the social cost of greenhouse gases are by far the most accurate and comprehensive metrics thus far developed by the federal government. After the Trump Administration purported to rescind those values by executive order, Exec. Order. 13,783 § 5(b) (2017), EPA and other agencies began using a set of improvised, non-peer-reviewed "interim domestic" social cost of greenhouse gas values that effectively decimated the Interagency Working Group's estimates. As held in a recent federal court decision, the "interim domestic" values are arbitrary and capricious and "riddled with flaws," while the Interagency Working Group's values reflect "the best science available." *California v. Bernhardt*, 2020 WL 4001480, at *28 (N.D. Cal. July 15, 2020).

use venting gas-driven pneumatic controllers *of any type* after January 1, 2021.[83] Further, all large compressor stations will require retrofit of *all* venting gas-driven pneumatic controllers by January 1, 2022.[84] In Alberta, no new gas-driven venting pneumatic controllers can be installed at any facility (new or existing) after January 1, 2022.[85]

These regulations show the confidence that these provincial governments and operators in Canada have in solar-powered electric controllers (grid power is unusual at production sites in Canada) and instrument air technology. Solar-powered controllers have been utilized for a number of years in Alberta where they are included in the design for separator equipment packages from certain manufacturers. Other operators have utilized similar solar-powered systems in custom configurations (for example to provide more electrical power and storage than is available in standard packages). Solar systems are used on all well sites, including those that are low-producing.

This technology has proven reliable in Alberta north of 55°N latitude, where: sunlight on a clear winter day is far weaker than in Pennsylvania; snowfall is higher; winter cloud cover is much more common; and winter temperatures are much lower (affecting battery capacity). There is no reason this technology cannot succeed in Texas.

F. Emissions Threshold for Control of Storage Tanks

We urge TCEQ to reevaluate and include in this proposed rulemaking an applicability threshold (based on potential VOC emissions) for control of certain storage tank emissions that is more stringent than EPA's recommendation in the 2016 oil and gas CTG Rule.[86] EPA recommended 95% reduction of VOC emissions only for those tanks with a potential to emit of 6 tpy or greater across all facilities, but more recent information indicates that threshold should be reduced. Pennsylvania, for example, has adopted EPA's 6 tpy applicability threshold only for those tanks located at a conventional well site or at an unconventional well site installed *prior* to August 10, 2013 (the effective date for Exemption 38 criteria). Otherwise, for storage tanks located in the transmission and storage segment or at natural gas gathering and boosting stations, processing plants, or

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[83] See BC Regulation 282/2010, §52.05(2). http://www.bclaws.ca/civix/document/id/regulationbulletin/regulationbulletin/Reg286_2018.

[84] *Id.*

[85] See Alberta Energy Regulator (2020), "Directive 060 - Upstream Petroleum Industry Flaring, Incinerating, and Venting," §8.6.1. https://www.aer.ca/documents/directives/Directive060_2020.pdf.

[86] Proposed 30 TAC §115.112.

unconventional well sites installed after August 10, 2013, Pennsylvania established a potential to emit threshold of 2.7 tpy VOC, which has been in place for several years.[87]A threshold of 2.7 tpy VOC is also appropriate given the very low cost of controlling VOC from these sources relative to others that cannot be controlled with devices that actually increase revenue for facility operators.

In addition to establishing a 2.7 tpy VOC threshold for all storage tanks, a "storage vessel" should be defined so that two or more physical tanks that are manifolded together are treated as a single unit for the purposes of determining applicability. In recent years, it has become more common for multiple storage tank batteries, sometimes containing different liquids, to be manifolded at the emissions line and routed to a common control device. It is a more rational approach to use the sum total emissions from these tank batteries for applying control requirements and is consistent with the long- standing definition used in other jurisdictions like Colorado.[88] Otherwise, operators will be incentivized to install multiple smaller tanks on a site to avoid having a single tank that exceeds the emissions threshold and is subject to the 95% emissions control standard. Of course, actual emissions in that case would be as high as from a single uncontrolled tank.

G. TCEQ Must Address Compressor Venting / Blowdowns.

Compressors must periodically be taken off-line for maintenance, operational stand-by, or emergency shutdown testing. During this process, methane may be released to the atmosphere from a number of sources. In particular, when compressor units are shut down, the high-pressure gas remaining within the compressors and associated piping between isolation valves is often vented to the atmosphere. This process, known as a "blowdown," can produce significant emissions and is accompanied by loud noise pollution, which can spike up to 90 decibels. Unfortunately, there are no effective emission control requirements established in the proposed rulemaking for blowdown episodes.

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[87] DEP Technical Support Document, "General Plan Approval and General Operating Permit for Unconventional Natural Gas Well Site Operations and Remote Pigging Stations (BAQ-GPA/GP-5A) and for Natural Gas Compressor Stations, Processing Plants, and Transmission Stations (BAQ-GPA/GP-5), p. 26 (Feb. 4, 2017), available at: http://www.depgreenport.state.pa.us/elibrary/GetDocument?docId=10735&DocName=TECHNICAL%20SUPPOR T%20DOCUMENT%20FOR%20GP-5%20AND%20GP-

5A.PDF%20%20%3Cspan%20style%3D%22color%3Ablue%3B%22%3E%3C%2Fspan%3E

[88] CO Reg. 7, § XVII.C, available at: https://www.colorado.gov/pacific/cdphe/aqcc-regs

Episodic events like compressor blowdowns and methane slip from compressor exhaust are some of the largest sources of methane and VOC emissions.[89] Any effort to reduce emissions should also require control of these sources using best available management practices. This is especially critical for compressor stations, which are often located near homes and community spaces like schools and parks.

Moreover, there are no notice requirements for scheduled blowdowns and no reporting or recordkeeping requirements for emissions from such events. Nor are there direct standards that require operators to reduce or control emissions during blowdowns. This is a significant gap in the proposed rulemaking. In Pennsylvania, for example, data from only unconventional wells and compressor stations shows that VOC emissions from blowdown vents alone exceeded 1,815 tons from 2012-2018, while methane emissions from these sources exceeded 169,000 tons during this same period.[90] Therefore, we urge TCEQ to include control requirements in this proposed rulemaking to reduce blowdown emissions.

There are multiple cost-effective, technologically feasible means by which operators can responsibly control emissions from blowdowns, and we urge TCEQ to strengthen the proposed rulemaking by including standards to require such control. EPA's Natural Gas STAR program and participating program partners have found that simple changes in operating practices and in the design of blowdown systems can save money and significantly reduce VOC and methane emissions.

In particular, we encourage TCEQ to consider the example from Ohio, which recently finalized a series of new general permits that will reduce air pollution from natural gas compressor stations. Among these new permits, General Permit 17.1 establishes that reciprocating compressors (located at compressor stations) shall be designed with a technology that captures and controls emissions from compressor isolation valves and compressor blowdown vents.[91] Ohio EPA allows operators to meet this requirement in one of two ways: (1) a design that captures 100% of gasses from these sources and routes them to a

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[89] D. Zimmerle et al. (2020). Methane Emissions from Gathering Compressor Stations in the U.S. Environ. Sci. Technol. 54 7552. https://pubs.acs.org/doi/10.1021/acs.est.0c00516

[90] DEP Air Emissions Report, http://cedatareporting.pa.gov/reports/powerbi/Public/DEP/AQ/PBI/Air_Emissions_Report.

[91] *See* Ohio EPA General Permit 17.1 Template, Reciprocating Compressor for Natural Gas Service, available at http://epa.ohio.gov/Portals/27/genpermit/GP17.1_F20170221.pdf.

flare designed for 95% destruction; or (2) a design that first routes the high pressure gasses to a low pressure line in order to reduce the gas pressure prior to venting to the atmosphere the remaining low pressure gas such that at least 90% of the gasses are recovered. GP 17.1 further requires that operators shall minimize the frequency and size of blowdown events by "conducting routine operation and maintenance activities in a manner consistent with safety and good air pollution control practices." We urge TCEQ to follow Ohio's lead and adopt similar emission mitigation measures for blowdown events, with a decided preference for the control method that will result in the greatest emission reductions.

H. TCEQ Should Apply the RACT Regulations to Sources Outside the DFW and Houston Areas, which Contribute to Violations of the NAAQS.

Under section 172(c)(1) of the Clean Air Act, 42 U.S.C. 7502(c)(1), TCEQ is required to "provide for the implementation of all reasonably available control measures . . . (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 "as expeditiously as practicable." Moreover, 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."[92] To that end, EPA has consistently interpreted "contribute" to mean those sources that "sufficiently" contribute to nonattainment.[93] Additionally, EPA has consistently found that impacts greater than one percent of the applicable NAAQS are "significantly" contributing to nonattainment.[94]

Under section 172(c) of the Clean Air Act, 42 U.S.C. § 7502(c), the DFW and Houston nonattainment areas must attain compliance with the 2008 eight-hour ozone standard of .075 ppm as expeditiously as practicable, but no later than July 20, 2021. Based on current monitoring data, it is unlikely that either area will achieve timely attainment of the 2008 eight-hour standard. DFW and the Houston

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[92] 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 (emphasis added).

[93] Cf. *See Catawba Cnty., N.C. v. EPA*, 571 F.3d 20, 39 (D.C. Cir. 2009) (upholding EPA's decision to designate sources as being in nonattainment with the NAAQS where the source is contributing to an areas with a violating monitor).

[94] *See* 76 Fed. Reg. 80760 (Dec. 27, 2011) (final Cross State Air Pollution Rule); 75 Fed. Reg. 45210, 45232-37 (Aug. 2, 2010) (explaining application of one percent significance threshold in proposed Cross-State Air Pollution Rule); 70 Fed. Reg. at 25193 (Clean Air Interstate Rule); 63 Fed. Reg. at 57379-80 (NOx SIP Call).

area are similarly likely to fail to meet the attainment deadline for the 2015 ozone NAAQS, as is the San Antonio nonattainment area.

Given the Clean Air Act's requirement under these circumstances to implement "all reasonably available control measures" as expeditiously as practicable, and in light of monitoring demonstrating that the DFW, HGB, and San Antonio areas will fail to meet their respective attainment deadlines, TCEQ should consider obvious and available VOC emission reduction measures that will reduce ozone pollution in those areas—namely, applying the VOC RACT Regulations to oil and gas sources throughout the state. As TCEQ has recognized in other contexts, VOC pollution from Texas oil and gas sources are a contributing cause of ozone NAAQS violations in the DFW area.[95] Many of those oil and gas sources are upwind of the DFW area on high ozone days, and contribute significantly to ozone nonattainment in the DFW area.[96] Oil and gas production facilities similarly contribute to ozone exceedances in the Houston and San Antonio areas. As such, TCEQ must evaluate the possibility of applying the VOC RACT regulations to oil and gas sources across the state that are contributing to nonattainment in and around the DFW, Houston, and San Antonio areas.[97]

The fact that some oil and gas sources are physically outside the DFW or Houston nonattainment area boundaries does not preclude TCEQ from applying the RACT regulations to those sources. In similar contexts, TCEQ has used emission limits of sources outside the DFW nonattainment area, including measures to control electric generating units, before. For example, TCEQ lists Utility Electric Generation in East and Central Texas, 30 TAC Chapter 117, Subchapter E, Division 1 as one of the existing measures to control ozone in the DFW nonattainment area.[98] TCEQ also lists East Texas Combustion Sources Rule, 30 TAC Chapter 117, Subchapter E, Division 4 as another measure and explains: "Measure implemented to reduce ozone in the DFW nonattainment area although controls not applicable in the DFW nonattainment area[.]"[99] TCEQ certainly has authority to apply the VOC RACT regulations to any source in Texas that contributes to ozone nonattainment.

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[95] See, e.g., Dallas-Fort Worth 2008 Eight-Hour Ozone Nonattainment Area Demonstration State Implementation Plan ("2013 SIP") Revision at 3-75, SIP Project No. 2013-015-SIP-NR.
[96] Technical Support Document DFW-MOAAD at 23 (recognizing that upwind emissions in East Texas contribute approximately 13% of ozone in DFW area); EPA Feb. 2015 Comments at 2; SIP 5-3.
[97] *Sierra Club v. E.P.A.*, 294 F.3d 155, 163 (D.C. Cir. 2002) (approval of SIP revision arbitrary and capricious where failed to consider whether any particular measures fell within the definition of RACM, and failed to evaluate those measures).
[98] 2013 SIP 4-2.
[99] *Id*. at 4-3.

Applying the RACT regulations to oil and gas sources that contribute to ozone nonattainment in DFW and Houston will not only ensure tangible air quality improvements in those areas, but it will help TCEQ satisfy other Clean Air Act requirements and represents an efficient approach to environmental regulation. EPA's regulations encourage a multi-pollutant, multi-program approach satisfying the Clean Air Act's requirements. 80 Fed. Reg. 12,264. Applying the RACT regulations to oil and gas sources outside the DFW and Houston areas, but which contribute to nonattainment, will not only expedite attainment, but it will also help TCEQ and Texas to comply with numerous other environmental protection obligations, including:

- Applying the RACT regulations to oil and gas sources outside of DFW and Houston, and in the Permian Basin specifically, could help satisfy Texas' obligation under the 2008 and 2015 ozone NAAQS Good Neighbor provision, *i.e.* 42 U.S.C. § 7410(a)(2)(D)(i)(I).

- Applying the RACT regulations to oil and gas sources outside of DFW and Houston could also help avoid a nonattainment designation for the El Paso area and other parts of the Permian Basin, including areas of New Mexico. That in itself would be a serious accomplishment for TCEQ. After decades of being under federal mandates, this would provide Texas with considerably more discretion and would save TCEQ considerable resources.

- It is also worth noting that the second compliance period for the Regional Haze program begins in 2021. Applying the RACT regulations to oil and gas sources throughout Texas could help (although it is not, by itself, sufficient to) fulfill Texas's obligations with regard to reasonable progress for the second compliance period for the Regional Haze program as well as Texas' obligation under 42 U.S.C. § 7410(a)(2)(D)(i)(II)(prong 4) with regard to the 2015 ozone NAAQS.

Not only does developing RACM rules now to attain the 2015 ozone NAAQS make sense from a government efficiency point of view, it is actually mandated by the Clean Air Act. 42 U.S.C. § 7410(l) provides that EPA cannot approve a SIP if it would interfere with any applicable requirement concerning attainment and reasonable further progress or any other applicable requirement. An applicable requirement concerning attainment is that attainment must be achieved as expeditiously as practicable. TCEQ's failure to apply the RACT regulations to emissions from oil and gas sources outside of DFW and Houston will actually *interfere* with the DFW and Houston areas' ability to attain the 2015 NAAQS as expeditiously as practicable and thus violate 42 U.S.C. § 7410(l).

III. CONCLUSION

Sierra Club appreciates the opportunity to submit these comments on behalf of its nearly 30,000 members in Texas—including thousands of members and supporters who live, work, and recreate in the 19 counties in the DFW, Houston, and San Antonio areas where the air is already unhealthy to breathe due, in part, to pollution from oil and gas sources. TCEQ's proposed RACT Rules an opportunity to reduce VOC pollution from oil and gas sources and increase monitoring from those sources, and therefore improve air quality in both the Houston and DFW areas, and throughout Texas. In light of the long history of ozone nonattainment in DFW and Houston, TCEQ should implement robust and protective RACT rules for VOC emissions from oil and gas sources that help bring those areas into attainment as expeditiously as practicable.

Sincerely,

Joshua Smith
Staff Attorney
Sierra Club
2101 Webster Street, Suite 1300
Oakland, CA 94612
joshua.smith@sierraclub.org

Four Highest Eight-Hour Ozone Concentrations in 2023 as of July 17

Use this form to retrieve the four highest eight-hour ozone concentration averages from data collected at TCEQ monitoring sites beginning December 14, 2005 through today. Although this is our most current data, it is not considered official until it has been certified by our technical staff. This information is updated hourly. All times shown are in Local Standard Time.

The table below lists the four highest daily maximum eight-hour ozone concentrations measured in 2023 in each community where the TCEQ measures ozone. Concentrations that are rated Moderate or higher are color-highlighted based on the EPA-defined Air Quality Index colors. (See Interpreting the AQI.) The fourth-highest average is in bold black (unless it is highlighted). All ozone measurements are in parts per billion. Times are shown in 24-hour format and correspond to the beginning of the eight hour average.

Use the selection boxes below to customize this report. You may select a different year or a different report format. If you want to cut and paste data from this web page into another application, such as a spreadsheet, select the comma-delimited format. Click on the Generate Report button once you have made your selections.

Year **Report Format**

2023 | Tabular (Web Formatted) | Generate Report

☑ **Highlight with AQI colors**

Area	Monitoring Site	POC	Highest			Second Highest			Third Highest			Four
			Date	Time	Value	Date	Time	Value	Date	Time	Value	Date
Dallas-Fort Worth												
	Ft. Worth Northwest C13/AH302	2	06/07/2023	1000	83	05/24/2023	1100	81	05/26/2023	1000	79	06/09/20
	Keller C17	2	06/07/2023	1200	80	05/22/2023	1200	77	05/26/2023	1100	75	06/09/20
	Frisco C31/C680	1	06/08/2023	1100	78	06/09/2023	1100	72	06/07/2023	1300	72	05/26/20
	Denton Airport South C56/A163/X157	1	05/22/2023	1100	80	06/09/2023	1200	78	05/31/2023	1100	77	05/27/20
	Arlington Municipal Airport C61	1	06/07/2023	1000	76	05/26/2023	1000	**70**	05/24/2023	1000	**70**	06/08/20
	Dallas North No.2 C63/C679	1	06/08/2023	1000	78	06/07/2023	1200	78	06/09/2023	1100	73	05/26/20
	Rockwall Heath C69	1	06/08/2023	1000	**69**	05/26/2023	1000	**62**	06/07/2023	1300	**58**	05/27/20
	Grapevine Fairway C70/A301/X182	1	06/07/2023	1200	80	05/22/2023	1200	80	06/09/2023	1100	78	07/10/20
	Kaufman C71/A304/X071	1	06/07/2023	1000	73	06/08/2023	0900	71	05/26/2023	0900	**69**	05/27/20
	Granbury C73/C681	1	05/24/2023	1300	72	06/05/2023	1000	**66**	06/03/2023	1100	**66**	06/08/20
	Eagle Mountain Lake C75	1	06/07/2023	1000	79	05/22/2023	1200	79	05/26/2023	1000	78	07/10/20
	Parker County C76	1	05/24/2023	1200	75	05/02/2023	1300	**67**	05/26/2023	1100	**66**	05/03/20
	Cleburne Airport C77/C682	1	05/26/2023	1100	**67**	05/17/2023	1200	**67**	06/06/2023	0900	**66**	06/07/20
	Dallas Hinton St. C401/C60/AH161	3	06/07/2023	1100	94	06/08/2023	1000	72	05/22/2023	1100	72	06/09/20
	Dallas Executive Airport C402	1	06/07/2023	1100	91	05/22/2023	1100	73	05/26/2023	1000	72	06/18/20
	Greenville C1006/A198	1	06/08/2023	1000	76	05/26/2023	0900	**60**	06/07/2023	1000	**59**	05/23/20
	Pilot Point C1032	1	06/09/2023	1200	78	06/27/2023	1100	71	06/08/2023	0900	71	05/23/20
	Italy C1044/A323	1	05/17/2023	1100	72	05/26/2023	1000	**67**	05/28/2023	1000	**64**	05/20/20
	Corsicana Airport C1051	1	05/26/2023	0800	**64**	06/07/2023	0900	**62**	06/08/2023	0800	**61**	06/02/20
Tyler-Longview-Marshall												
	Longview C19/A127/C644	2	05/23/2023	1000	**68**	06/08/2023	1000	**67**	05/22/2023	1000	**67**	06/09/20
	Tyler Airport Relocated C82	1	05/27/2023	1000	76	06/06/2023	1000	71	06/08/2023	0900	**69**	05/23/20

	Karnack C85/AFHP303	1	06/09/2023	1000	**67**	06/06/2023	1000	**64**	05/31/2023	0900	**63**	05/27/20
El Paso-Juarez												
	Ascarate Park SE C37/A332/A172/X159	1	07/05/2023	1100	**63**	07/14/2023	1000	**61**	07/04/2023	1000	**59**	07/03/20
	Chamizal C41/AH126	1	07/04/2023	1100	**70**	07/03/2023	0900	**68**	07/14/2023	1000	**65**	07/05/20
	Socorro Hueco C49/F312	1	05/12/2023	1000	73	07/01/2023	1000	**66**	06/05/2023	1000	**64**	06/03/20
	Skyline Park C72	1	07/05/2023	1100	**67**	06/27/2023	0900	**67**	07/03/2023	1000	**65**	06/13/20
	Ivanhoe C414/F514	1	07/05/2023	1100	**67**	07/14/2023	1000	**63**	07/01/2023	0900	**63**	05/12/20
	Ojo De Agua C1021/FG121/FG221	1	07/04/2023	1100	74	07/03/2023	0900	72	05/16/2023	1000	**69**	06/05/20
Waco												
	Waco Mazanec C1037	1	06/07/2023	1000	**70**	05/26/2023	1000	**69**	06/09/2023	1100	**67**	05/28/20
	Temple Georgia C1045	1	06/09/2023	1000	**67**	06/07/2023	1100	**65**	03/04/2023	1100	**64**	05/26/20
	Killeen Skylark Field C1047	1	02/27/2023	1000	**68**	04/13/2023	1000	**62**	04/17/2023	1100	**61**	06/20/20
Beaumont-Port Arthur												
	Beaumont-Downtown C2/A112/C2002	2	05/19/2023	0800	**68**	06/05/2023	1100	**67**	06/01/2023	1000	**67**	05/03/20
	West Orange C9/A141	2	05/19/2023	0900	71	06/09/2023	1200	**69**	06/03/2023	1000	**65**	05/03/20
	Port Arthur West C28/A128/A228	1	05/01/2023	1100	**67**	05/26/2023	1000	**64**	06/09/2023	1100	**63**	05/27/20
	Hamshire C64/C654	1	05/01/2023	1000	**67**	05/27/2023	0900	**65**	05/03/2023	1000	**65**	05/26/20
	SETRPC Port Arthur C628	1 **N**	06/09/2023	1000	82	05/26/2023	1000	73	05/22/2023	1100	73	05/23/20
	SETRPC 40 Sabine Pass C640/C1654	1	05/23/2023	1000	75	05/22/2023	1100	74	06/09/2023	1100	**68**	06/08/20
	SETRPC Mauriceville 42 C642/C311/C665	1 **N**	06/01/2023	1000	**66**	05/04/2023	0900	**64**	05/02/2023	0900	**64**	06/09/20
	SETRPC 43 Jefferson Co Airport C643	1	05/01/2023	1100	72	05/27/2023	1000	**65**	05/26/2023	1000	**65**	06/05/20
	Nederland 17th Street C1035	1	05/01/2023	1000	77	06/09/2023	1100	**69**	05/27/2023	1000	**69**	06/01/20
Austin												
	Austin North Hills Drive C3/A322	2	06/07/2023	1000	74	03/04/2023	1100	72	05/22/2023	1100	**67**	02/27/20
	Audubon C38	1	06/07/2023	1000	**69**	05/27/2023	0900	**63**	03/04/2023	1100	**62**	05/18/20
	Dripping Springs School C614	1 **N**	04/17/2023	1100	**66**	05/26/2023	1200	**63**	06/07/2023	1100	**62**	05/27/20
	CAPCOG Lake Georgetown C690	1 **N**	06/07/2023	1100	74	02/27/2023	1300	**64**	05/18/2023	1000	**63**	06/08/20
	Lockhart C1604	1 **N**	05/17/2023	1000	73	05/18/2023	1100	**68**	06/07/2023	1000	**63**	05/27/20
	St. Edwards University C1605	1 **N**	05/27/2023	1000	**56**	05/22/2023	1000	**55**	05/17/2023	1100	54	03/28/20
	CAPCOG Bastrop CAMS1612	1 **N**	05/03/2023	1100	**65**	06/07/2023	1000	**64**	05/27/2023	1000	**60**	05/01/20
	CAPCOG Elgin C1613	1 **N**	05/27/2023	1000	**65**	06/07/2023	1100	**64**	05/03/2023	1200	**63**	02/27/20
	CAPCOG East Austin C1619	1 **N**	06/07/2023	1100	**70**	03/04/2023	1100	**66**	05/22/2023	1000	**65**	03/28/20
	CAPCOG Round Rock Brushy Creek W C1620	1 **N**	06/07/2023	1100	**67**	06/08/2023	1000	**62**	06/09/2023	1000	**61**	02/27/20
	CAPCOG Taylor Murphy Park C1629	1 **N**	06/09/2023	1000	**64**	06/07/2023	1000	**64**	06/08/2023	0900	**63**	05/27/20
	CAPCOG Lake Kyle Park C1630	1 **N**	05/27/2023	1000	**63**	05/17/2023	1100	**60**	05/26/2023	1200	**57**	05/28/20
	CAPCOG San Marcos Staples Road C1675	1 **N**	06/07/2023	1100	**67**	05/27/2023	1000	**63**	03/04/2023	1000	**61**	05/17/20
Houston-Galveston-Brazoria												
	Houston East C1/G316	2	05/18/2023	1000	110	05/01/2023	1100	91	06/09/2023	1000	87	06/07/20
	Houston Aldine C8/AF108/X150	2	06/09/2023	1000	81	05/18/2023	1100	79	06/02/2023	1000	77	05/01/20
	Channelview C15/AH115	3	06/09/2023	1000	91	05/18/2023	1100	87	05/01/2023	1000	76	06/02/20
	Northwest Harris Co. C26/A110/X154	2	06/02/2023	0900	82	05/31/2023	1000	82	05/03/2023	1100	79	05/18/20

Hou.DeerPrk2 C35/235/1001/AFH139FP239	1	05/18/2023	1100	93	06/07/2023	1000	89	05/01/2023	1000	81	05/23/20
Seabrook Friendship Park C45	1	05/23/2023	1000	75	05/22/2023	1200	73	06/07/2023	1000	**70**	05/17/20
Houston Bayland Park C53/A146	1	05/18/2023	1100	97	05/23/2023	0900	85	05/27/2023	1000	84	05/26/20
Conroe Relocated C78/A321	1	06/02/2023	1100	77	05/19/2023	1200	77	06/22/2023	1100	72	04/28/20
Manvel Croix Park C84	1	05/18/2023	1100	81	05/23/2023	1100	80	05/22/2023	1100	80	05/26/20
Clinton C403/C304/AH113	3	05/18/2023	1100	108	05/01/2023	1100	86	05/27/2023	1000	76	05/23/20
Houston North Wayside C405/C1033	1	05/18/2023	1100	84	06/09/2023	1000	81	06/02/2023	1000	74	05/01/20
Houston Monroe C406	1	05/18/2023	1000	81	06/07/2023	1000	79	05/23/2023	0900	74	05/27/20
Lang C408	2	05/18/2023	1200	96	05/01/2023	1100	83	06/09/2023	1000	75	06/06/20
Houston Croquet C409	2	05/18/2023	1100	82	05/27/2023	1000	78	05/23/2023	1100	78	05/26/20
Houston Westhollow C410/C3003	1	05/27/2023	1000	75	05/18/2023	1100	75	06/06/2023	1000	**69**	05/26/20
Park Place C416	1	05/18/2023	1100	101	05/27/2023	1000	85	06/07/2023	1000	84	05/01/20
Houston Harvard Street C417	1	05/18/2023	1100	108	06/09/2023	1000	78	05/23/2023	0900	78	05/01/20
Sheldon C551	1 **N**	06/09/2023	1000	77	05/18/2023	1000	71	06/02/2023	0900	**66**	05/01/20
Baytown Wetlands Center C552	1 **N**	05/18/2023	1100	89	06/09/2023	0900	72	05/23/2023	0800	**68**	06/07/20
Crosby Library C553	1 **N**	06/09/2023	1000	76	06/03/2023	0900	**70**	06/02/2023	0800	**69**	05/19/20
West Houston C554	1 **N**	05/18/2023	1000	84	05/27/2023	0900	78	05/03/2023	1000	77	05/01/20
La Porte Sylvan Beach C556	1 **N**	06/07/2023	1000	75	06/04/2023	0900	72	06/09/2023	0900	**66**	06/08/20
Mercer Arboretum C557	1 **N**	06/09/2023	1000	83	05/19/2023	0900	76	06/01/2023	0900	73	05/18/20
Tom Bass C558	1 **N**	05/23/2023	0900	85	05/18/2023	1000	80	06/07/2023	1000	77	05/26/20
Katy Park C559	1 **N**	05/27/2023	0900	76	06/06/2023	0900	74	05/18/2023	0900	73	05/03/20
Atascocita C560	1 **N**	06/03/2023	1000	**63**	03/04/2023	1100	**62**	07/03/2023	0900	**59**	06/01/20
Meyer Park C561	1 **N**	06/02/2023	1000	83	05/31/2023	0900	71	05/03/2023	1000	71	05/18/20
Bunker Hill Village C562	1 **N**	05/18/2023	1000	93	05/27/2023	0900	81	05/23/2023	0900	76	05/03/20
Huffman Wolf Road C563	1 **N**	06/03/2023	0900	74	05/19/2023	0900	74	06/09/2023	1000	72	06/08/20
HRM-3 Haden Road C603/A114	1 **N**	05/18/2023	1100	105	05/01/2023	1100	90	06/09/2023	1000	84	06/07/20
Wallisville Road C617	1 **N**	06/09/2023	1000	91	05/18/2023	1200	75	06/07/2023	1100	71	05/03/20
Texas City 34th St. C620	1 **N**	05/23/2023	1000	98	06/04/2023	1000	90	06/07/2023	0900	83	05/22/20
UH Moody Tower C695	1 **N**	05/18/2023	1100	108	06/07/2023	1000	80	05/27/2023	1000	79	05/01/20
UH WG Jones Forest C698	1 **N**	06/02/2023	1000	83	06/01/2023	1100	80	05/19/2023	1100	78	04/28/20
Lynchburg Ferry C1015/A165	1	05/18/2023	1100	99	06/09/2023	1100	88	06/07/2023	1100	80	05/27/20
Lake Jackson C1016	1	05/24/2023	1000	74	05/26/2023	1000	71	05/23/2023	0900	**68**	03/25/20
Baytown Garth C1017	1	06/09/2023	1000	104	05/18/2023	1200	84	06/08/2023	1100	79	06/07/20
Galveston 99th St. C1034/A320/X183	1	06/04/2023	1000	80	05/24/2023	1200	79	05/23/2023	1100	79	05/26/20
UH Smith Point C1606	1 **N**	05/18/2023	1200	78	05/03/2023	1300	75	05/26/2023	1000	74	05/27/20
Oyster Creek C1607	1 **N**	05/24/2023	0900	73	05/27/2023	1100	72	03/25/2023	1300	**69**	05/23/20
UH Launch Trailer C1611	1 **N**	05/18/2023	1100	114	05/01/2023	1100	83	06/07/2023	1000	82	05/27/20
Liberty Sam Houston Library C1626	1 **N**	05/19/2023	1000	85	05/03/2023	1400	**65**	04/30/2023	1100	**62**	06/09/20
San Antonio											
San Antonio Northwest C23	2	05/22/2023	1100	**69**	06/07/2023	1100	**66**	05/27/2023	1000	**65**	04/17/20
Camp Bullis C58	1	06/21/2023	1000	76	05/22/2023	1100	**70**	05/27/2023	1000	**69**	06/07/20
Calaveras Lake C59	1	05/27/2023	1000	**65**	02/27/2023	1000	**65**	03/04/2023	1000	**64**	05/25/20
Elm Creek Elementary C501	1 **N**	05/27/2023	1000	**63**	06/08/2023	1100	**62**	05/24/2023	1100	**62**	05/25/20
Fair Oaks Ranch C502	1 **N**	06/21/2023	1000	75	05/27/2023	1000	**61**	05/22/2023	1200	**58**	05/18/20

[Bulverde Elementary C503](#)	1 N	06/21/2023	1000	**67**	06/20/2023	1100	**59**	04/13/2023	1100	**56**	06/22/20
[New Braunfels Airport C504](#)	1 N	03/04/2023	1000	**60**	02/27/2023	1000	**57**	06/07/2023	1000	**56**	05/27/20
[AACOG City of Garden Ridge C505](#)	1 N	06/07/2023	1100	**68**	05/27/2023	1000	**64**	06/09/2023	1000	**61**	05/25/20
[Seguin Outdoor Learning Center C506](#)	1 N	05/27/2023	1000	**55**	03/04/2023	1100	**55**	04/17/2023	1100	53	02/27/20
[Heritage Middle School C622](#)	1 N	05/27/2023	1000	**64**	05/17/2023	1100	**62**	06/07/2023	1200	**60**	05/25/20
[CPS Pecan Valley C678](#)	1 N	03/04/2023	1000	43	02/27/2023	1100	42	05/27/2023	1000	41	06/07/20
[Government Canyon C1610](#)	1 N	03/04/2023	1000	**56**	05/27/2023	1000	54	04/17/2023	1100	53	06/08/20
[Corpus Christi-Victoria](#)											
[Corpus Christi West C4](#)	2	05/25/2023	0900	**68**	03/25/2023	1500	**64**	06/08/2023	1000	**63**	05/24/20
[Corpus Christi Tuloso C21](#)	1	05/25/2023	1000	**71**	05/24/2023	1000	**66**	06/08/2023	1000	**65**	03/25/20
[Victoria C87](#)	1	06/07/2023	1000	**61**	05/27/2023	0900	**56**	03/04/2023	1100	**56**	06/08/20
[Lower Rio Grande Valley](#)											
[Harlingen Teege C1023](#)	1	06/08/2023	1100	**60**	05/25/2023	1400	**59**	04/17/2023	0900	**58**	04/30/20
[Laredo](#)											
[Laredo College C44](#)	1 N	06/14/2023	1200	**64**	05/26/2023	0700	**61**	05/25/2023	1700	**61**	05/14/20
POC (Parameter Occurrence Code): a code used to correctly separate data from multiple instruments at one site.											
N - Data from this instrument does not meet EPA quality assurance criteria and cannot be used for regulatory purposes.											

Interpreting the AQI

Each NAAQS pollutant has a separate AQI scale, with an AQI rating of 100 corresponding to the concentration of the Federal Standard for that pollutant. Additional information about the AQI and how it can be used is available from the EPA's [AirNow web site](#).

Place your mouse pointer over the scale displayed above to view information about the Air Quality Index, and each of the rating levels.

The actual index calculation is different for each parameter measured and is specified by the EPA. The following table shows the various breakpoints used in calculating the AQI.

AQI Breakpoint Definitions		
AQI Range	**1hr Ozone in ppm**	**8hr Ozone in ppm**
0 - 50	Not Defined	0 - 0.054
51 - 100	Not Defined	0.055 - 0.070
101 - 150	0.125 - 0.164	0.071 - 0.085
151 - 200	0.165 - 0.204	0.086 - 0.105
201 - 300	0.205 - 0.404	0.106 - 0.200
301 - 400	0.405 - 0.504	Not Defined
401 - 500	Not Defined	Not Defined
500+	Not Defined	Not Defined

- The AQI for ozone is based on either the peak eight-hour running average since midnight OR the peak one-hour measurement since midnight.

PLEASE NOTE: This data has not been verified by the TCEQ and may change. This is the most current data, but it is not official until it has been certified by our technical staff. Data is collected from TCEQ ambient monitoring sites and may include data collected by other outside agencies. This data is updated hourly. All times shown are in local standard time unless otherwise indicated.

Following EPA reporting guidelines, negative values may be displayed in our hourly criteria air quality data, down to the negative of the EPA listed Method Detection Limit (MDL) for the particular instrument that made the measurements. The reported concentrations can be negative due to zero drift in the electronic instrument output, data logger channel, or calibration adjustments to the data. Prior to 1/1/2013, slightly negative values were automatically set to zero.

Last Modified Tuesday, 30 Jan 2018

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS TX 75202-2733

FEB 11 2015

Ms. Kathy Singleton
MC 206, State Implementation Plan Team
Air Quality Division
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, Texas 78711-3087

Re: Dallas-Fort Worth Attainment Demonstration for the 2008 Eight-Hour Ozone Nonattainment Area, Project Number 2013-015-SIP-NR; Dallas-Fort Worth Reasonable Further Progress State Implementation Plan Revision for the 2008 Eight-Hour Ozone Standard, Project Number 2013-014-SIP-NR;Revisions to Chapter 115, Project Number 2013-048-115-AI; and Revisions to Chapter 117, Project Number 2013-049-117-AI

Dear Ms. Singleton:

Thank you for the opportunity to review the four proposed revisions that address the Dallas/Fort Worth (DFW) nonattainment area under the 2008 ozone standard. We have enclosed comments on the proposed attainment demonstration and RFP SIPs, and on the proposed revisions to Chapters 115 and 117. We appreciate the work by the TCEQ in developing these documents. Nonetheless, additional ozone reductions will be necessary to demonstrate attainment.

The proposed attainment demonstration (Project Number 2013-015-SIP-NR) is based on an attainment date of December 31, 2018. On December 23, 2014, the U.S. Court of Appeals for the D.C. Circuit held that the end of year attainment dates were not consistent with Congressional intent. *NRDC v. EPA*, 2014 U.S. App. LEXIS 24253 (D.C. Cir. 2014). Therefore, the EPA intends to promulgate a rulemaking to revise the attainment dates to a timeframe consistent with the court's decision. As a result, we anticipate that the attainment date will be earlier than the end of the 2018 ozone season, which means that the attainment year ozone season for the DFW nonattainment area will likely be 2017 rather than 2018.

We understand the loss of a year to demonstrate attainment presents challenges for the State. For example, the State will lose a year of expected ozone reductions from fleet turnover. These potential reductions will need to be "found" in other means to show attainment by the 2017 ozone season. While this will take further analysis and consideration by Texas, we are committed to working with you to identify solutions.

We look forward to discussing the enclosed comments with you. Please feel free to contact me or Ms. Carrie Paige of my staff at 214-665-6521, if you have questions.

Sincerely yours,

Guy Donaldson

Guy Donaldson, Chief
Air Planning Section

Enclosure

Project Number 2013-015-SIP-NR

Comments addressing the Dallas-Fort Worth Attainment Demonstration (AD)

The attainment year ozone season is the ozone season immediately preceding a nonattainment area's attainment date. In light of the recent decision made by the U.S. Court of Appeals for the D.C. Circuit,[1] we anticipate that the attainment date for the DFW area will be earlier than the end of the 2018 ozone season and thus, the attainment year ozone season for the DFW area will likely be 2017. Please revise the applicable elements of the attainment demonstration submittal to reflect the earlier attainment date. We expect the SIP requirements rule will be finalized soon addressing the Court's decision regarding the attainment date.

The attainment demonstration Motor Vehicle Emissions Budget (MVEB) will need to be revised to reflect the earlier attainment date.

The contingency plan is based on emission reductions from fleet turnover in 2019. The contingency plan will need to be revised to reflect the earlier attainment date. In addition, in the June 6, 2013 proposal for the ozone implementation rule, we proposed establishment of MVEBs consistent with the use of on-road fleet turnover as a contingency measure (see 78 FR 34178, 34199). Having such budgets would help to ensure that reductions from a fleet turnover contingency measure would be surplus and available for the SIP in the event that the contingency measures are triggered. TCEQ should include a MVEB for the fleet turnover contingency measure.

TCEQ has worked to refine its modeling platform using 2006 base case periods and evaluation of 2018 future year ozone levels. In accomplishing this work, TCEQ has performed a number of analyses to evaluate the model performance of the 2006 base case periods following EPA's modeling guidance. We appreciate TCEQ providing the supplemental modeling with updated emission inventory and model projections based on both EPA's existing 2007 modeling guidance and the new DRAFT modeling guidance methods that are currently out for public review and comment until March 13, 2015. We note using the new DRAFT modeling guidance methods, TCEQ projects all but one monitor to be in attainment (below 76 ppb) in 2018, and the Denton Airport South monitor is projected to be 76.13 ppb (design value or DV of 76). Using EPA's 2007 modeling guidance methods the values were projected to be slightly higher in 2018 with Denton at 77 ppb and Eagle Mtn. Lake and Grapevine monitors projected to be 76 ppb.

As part of the model platform evaluation and weight of evidence (WOE) TCEQ has done a number of modeling analyses and also evaluated emissions and monitoring trends. Overall we think the modeling is performing reasonably well, but there are some concerns with model performance of transported ozone and ozone precursors as discussed below and by TCEQ in Appendix C of the proposal. Overall the WOE components raise some concern about whether the DFW area will be able to obtain the 2008 8-hour ozone standard of 75 ppb in 2018. The recent court decision that indicates the attainment year will likely be 2017 for moderate classification areas such as DFW, makes it less clear that the area will attain the standard by 2017 without additional reductions. See below for more detailed comments on the modeling and WOE.

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[1] *NRDC v. EPA*, 2014 U.S. App. LEXIS 24253 (D.C. Cir. Dec. 23, 2014).

Comments addressing the RACM analysis

Please provide the estimated amount of NOx emission reductions (in tpd) that would reduce ozone values at the monitors by 1 ppb. In the Tables in Appendix D, please include the estimated emissions reductions associated with each of the measures. This additional information will help determine which measures, separately or in combination, would assist in advancing the attainment date for measures that can be implemented prior to the beginning of the attainment year ozone season.

Within the RACM analysis, the TCEQ estimates that reducing the source cap for the kilns in Ellis County would not provide significant NOx emission reductions for the DFW area. However, a reduction in the source cap of 4.6 tpd, as estimated by the TCEQ, does appear significant, compared with the emissions reductions estimated for other sources of NOx in the DFW area. What modeling or other analyses were performed that support the TCEQ's conclusion regarding the source cap?

The TCEQ provided an evaluation of emissions from all of the utility electric generators in east and central Texas. However, the discussion in Appendix D on the formation, background levels, and transport of ozone strongly supports the implementation of controls on NOx sources located to the east and southeast of the DFW nonattainment area. How would a reduction in NOx emissions from utility electric generators in just the counties closest to the eastern and southern boundaries of the DFW area impact the DFW area?

Comments addressing the proposed VOC RACT analysis

EPA supports the inclusion of major sources of VOC located in Wise County to become subject to the requirements of 30 TAC Chapter 115.

EPA appreciates the VOC RACT analysis provided by TCEQ.

Comments addressing the proposed NOx RACT analysis

There has been a significant drop in the ambient NOx concentration for Ellis County in part due to past NOx control measures concerning cement kilns operating in the DFW nonattainment area and we applaud TCEQ for these efforts. Because of significant changes in the type and number of cement kilns in Ellis County, however, TCEQ's rules need to be reevaluated to insure these reductions are maintained, and the emission limits reflect a RACT level of control as required by the Clean Air Act.

In particular, the retirement of the higher emitting wet kilns and operation of more energy efficient and lower emitting dry kilns in Ellis County makes it necessary for the TCEQ to revisit its NOx cap limit, set forth in 2007 at 17.4 tons per day (tpd). This limit was set, in part, based on higher emission rates for wet kilns. Therefore, with fewer sources contributing to the cap, the dry kilns essentially have a less stringent emission rate requirement. We can no longer conclude the emission limit that is in place reflects a RACT level of control. An evaluation of the RACT for cement kilns in Ellis County is needed that reflects the level of control that can reasonably be achieved and new limits to reflect the reasonable level of control. TCEQ can either establish appropriate rate based limits (lbs/ton of clinker) for each unit or it can establish a cap based on appropriate rate based emission rates. It is important to recognize that the SIP emission limit needs to reflect RACT. We believe that a rate base limit will preserve any necessary operational flexibility as it sets no limit on production rates. Failure to conduct a thorough RACT analysis for cement kilns which would include appropriate emission limits would prevent us from approving the RACT portion of the attainment plan submittal.

Comments addressing the proposed AD SIP, Appendix H: Local Initiatives Submitted by the North Central Texas Council of Governments

We appreciate the work done by the North Central Texas Council of Governments (NCTCOG) in developing the list of local initiatives. The submittal letter from the NCTCOG indicates that the initiatives are "expected to be implemented by 2018." In light of the recent Court decision[2] and consequential need for EPA to establish an earlier attainment date, please list the local initiatives that will be completed by March 1, 2017.

DFW AD/WOE Detailed comments

As discussed above, EPA provided new DRAFT modeling guidance (Dec. 2014) that is currently out for review and stakeholder comments until March 13, 2015. EPA's current plan is to review comments and finalize the revised modeling guidance by the end of the year (2015). The guidance may change further based on comments. In this transitional period, we recommend that TCEQ continue to provide the attainment test analysis using both the existing 2007 modeling guidance approach and the new approach recommended in the December 2014 DRAFT modeling guidance.

The updated modeling results provided in early January by TCEQ indicate one monitor at 76 ppb in 2018 using the new DRAFT guidance and existing guidance methods indicate 77 ppb at Denton and 76 ppb at Eagle Mtn. Lake and Grapevine. We note that these numbers will most likely go up some with an attainment demonstration based on 2017. We request that TCEQ supplement their analysis as needed to show that the area will attain by 2017.

There should be further analysis and documentation evaluating the days being used in the attainment test. The days that are being used at each monitor should be identified. In limiting the days to 10 days, an evaluation of the performance on each day and the type of meteorology/transport phenomena of each day should be provided. The main principal of the attainment test is to limit the days to the higher days at the monitor, but there needs to be an evaluation of the days used to make sure that the set of days used represents the conceptual model for the area and is representative of all the days that yield ozone exceedances. In doing this evaluation it may be that more than 10 days are necessary for some monitors. For example: the later summer episode is important to the conceptual model and some of these days may not be included based on the 10 days threshold.

Overall, the WOE analysis is not overly supportive that the modeling is conservative. TCEQ has provided information on recent ozone trends to support its conclusion the area will attain by 2018. Most of the recent years, however, have been average or below normal in overall conduciveness for ozone formation. Temperature has been high for some of these years which does lead to higher ozone, but wind speeds have also been higher than normal which leads to lower ozone concentration with more dispersion. 2011 was one of these type of years. 2014 had very favorable meteorology and was one of the lowest ozone monitoring years in the Eastern half of the US with a 2014 DFW area DV of 81 ppb. It was abnormal, due to its lower than average temperature and frequency of frontal passages that led to reduced background build up, and not likely to be repeated.

The 2013 DV data for the DFW area was 87 ppb, indicating an 11 ppb drop would have to occur within four to five years to reach attainment in 2017 or 2018. Even considering the anomalous 2014, the area has to drop another 6 ppb.

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[2] *NRDC v. EPA*, 2014 U.S. App. LEXIS 24253 (D.C. Cir. Dec. 23, 2014).

We note that normal on-road/non-road fleet turnover within areas of DFW and Texas will help lower ozone levels in the DFW area. In TCEQ's SIP proposal, TCEQ provides a long term trends analysis that also included a linear relationship to estimate the long term ozone level change. This equation indicates the 8-hour values have dropped at a rate of 1.1 ppb per year. We modified the table to extrapolate the DFW 8-hour ozone DVs in 2017 and 2018, which were still 80-82 ppb for these future years based on this rate of reduction. See Figure 1 on page 7. Since the overwhelming majority of reductions of NOx in the plan are the federal measures for on road and off road sources, it seems unreasonable to expect this rate of reduction to accelerate. Based on the monitoring data and lack of additional large reductions in NOx within areas of Texas that impact DFW, it is difficult to see how the area would reach attainment in 2018 based solely on federal measures reductions from mobile and non-road. The fact that the attainment year will likely be 2017 makes the chance of attainment smaller.

Evaluation of the model performance data and source apportionment indicates that the model may be oversensitive to low-level NOx reductions and has some issues with NOx level predictions in the DFW area. We note that the kv patch (vertical diffusivity patch) to induce more vertical mixing may be resulting in better ozone performance in the base case, but the atmosphere may not be mixing as rapidly as the patch is indicating. This would result in the model being overly sensitive to low-level NOx reductions. This may compensate for emission projection errors in the base case, thus resulting in better model performance. We suspect the model may be providing more mixing than really occurs based on NO2 monitoring throughout the domain compared to modeled values. In particular, it tends to under-predict NOx concentrations in the western half of the domain and over-predict NOx concentrations in the upwind region. These issues with the NOx modeled levels could result in inaccurate ozone predictions and raise uncertainty in the attainment demonstration.

While the State has provided a large chapter on Weight of Evidence, the principal evidence is the recent monitor data. The monitor data does not show the large drops in local ozone levels and therefore raises a fundamental question whether the photochemical modeling is working as an accurate tool for assessing attainment in 2018 for DFW.

We also note that the modeling seems to project significant reductions due to out-of-state emission reductions, which reflects some of the expected trends in declining regional ozone levels.

Episode Analysis

Overall the June 2006 episode is a good episode and representative of the type of days from the conceptual model that drive the early summer exceedances in the DFW area. The inclusion of Aug-Sep 2006 is an improvement and attempts to include days that make up the latter summer period in DFW that are historically the worst days overall and usually drive the DV for the area. Latter summer 2006 was not typical and was actually light on ozone exceedances compared to the conceptual model, but was a step in the right direction. Because this period was below average it still hinders the analysis of later summer ozone events. Given the bimodal (peaks in June and higher peaks in Aug/Sep) we still have concern that the days that drive the overall DV and attainment of the area are underrepresented in the analysis.

Model Performance Analysis

We appreciate TCEQ's efforts to analyze the Model Performance of the base case modeling. In Appendix C, we note that for the August/September episode, the average over-prediction of observed Maximum Daily Average 8-hour Ozone (MDA8) ozone values is over 10 ppb (Figure 4-4 of the proposal, first set of bars), which is sufficient to cause concern. The TCEQ is investigating the causes of this bias and will take appropriate steps to ameliorate it, if possible, in the near future.

Strong underestimation of NOx at Kaufman area high monitored values could be affecting daytime scavenging. Hinton peak NOx may seem to be slightly overestimated, but given the close proximity to the I-35 corridor which is a large NO/NO2 source, modeled values would likely be higher for both the bilinear interpolation values and the 3x3 array values. Looking at the Ft. Worth NW monitor, it appears ozone on some high ozone days is being overestimated with a spread in the 75-90 ppb range, but the NOx seems underestimated on some of the higher ozone days/higher NOx monitored days. The underestimation bias on the highest NOx monitored days may be part of the reason for ozone overestimation especially in the latter summer episode. The overestimation of isoprene may also be playing into what is perceived as an ozone overestimation bias on the highest values.

The model performance time series analysis in Appendix C had modeled concentrations of HRVOC species much higher than observed at Hinton Street C401 and at Fort Worth Northwest C13 monitors.

Modeling on a number of days seems to be overestimating the MDA8 and overall ozone levels at the upwind monitors in the DFW area and this overestimation of background may be part of the reason for overestimation at downwind monitors. On some of these days this may indicate the local production is actually biased low on days that appear to have good downwind model performance. Looking at the analysis at the other upwind regional monitors (Italy, San Augustine, Clarksville, and Palestine) all appear to have an overestimation of regional levels and are especially off in the nighttime values. Modeled nighttime values range from 20-60 ppb higher, compared to monitor values. This is probably leading to the DFW upwind monitor performance issues especially on the morning hours and even on the MDA8 for many days. This issue may lead to the model being more responsive to regional background level changes than local changes.

We recommend identifying the 10 days used for each monitor on the daily ozone MDA8 plots in Figure 4 of the proposal. This could potentially be accomplished by adding the specific monitors on each day that was the day was used for the RRF analysis. As discussed above please document and show how the days (10 or more) fit with the overall conceptual model for the DFW area.

We appreciate the Source apportionment modeling that was included and find it informative. We note that it seems to indicate lower contributions from outside of Texas, than the upwind monitor analysis that Texas included. This is not surprising as the upwind monitor analysis approach can overestimate the amount of background ozone that is contributing to the exceedance since the monitor is not always completely upwind and does not necessarily pair in time with the contribution further downwind. On some of the highest transport days that also saw local exceedances predicted in DFW, the non-Texas component was usually less than 50 ppb and often 45-40 ppb or less. The source apportionment analysis comports with previous source apportionment analyses indicating that on many high ozone days in the DFW area, Texas sources contribute approximately half of the ozone.

WOE/Corroborative Analysis

Recent NOx trends (Figure 5-10 in TCEQ's Proposal) indicate a fairly flat NOx trend for several NO monitors in the western area of the DFW area (Eagle Mtn. Lake, Denton, and Parker County monitors). These monitors are in areas more impacted by the growth in NOx sources for Oil and Gas Development that seem to be countering the normal reduction in NOx levels seen at other monitors due to fleet turnover reductions (on-road and Nonroad). These higher NOx levels in the modeling domain that seem to be fairly flat with no change since 2009 raise concern that the area is not seeing the NOx reductions needed to bring the ozone levels down at these monitors.

We note that the attainment demonstration modeling includes reductions in NOx and VOC in Wise County from controls proposed for RACT in Wise County. These emission reductions were discussed/quantified in Appendix B of the proposal. Any SIP revisions based on removing Wise County would have to have the modeling adjusted so that it does not take credit for unenforceable reductions. Please confirm the estimate NOx emission reductions in Wise County match with the adopted regulations for NOx control in Wise County.

Previous control requirements put in place on natural gas fired compressor engines in the DFW 9-county area and in many upwind counties relied on NSCR catalytic convertors that typically require periodic changing of catalysts to maintain estimated control levels. Has Texas done any follow-up to confirm that proper maintenance is occurring to ensure the controls are still meeting the requirements?

The modeling includes emissions from Natural Gas production in the Barnett Shale area and projects NOx emissions to directly correlate with a decline in production levels. We have some concern that as well pressure diminishes that natural gas fired engines driving natural gas compressors may be utilized more than the current usage per production amount. This may result in the projected NOx emissions not dropping as much as projected. The same volume of gas being produced with less well head pressure flow could need more overall actual compression to get to market. This situation could result in more NOx emissions than estimated based on the current emissions/production level relationship. We recommend that TCEQ perform a study to confirm that the emissions trends projected in the modeling have occurred.

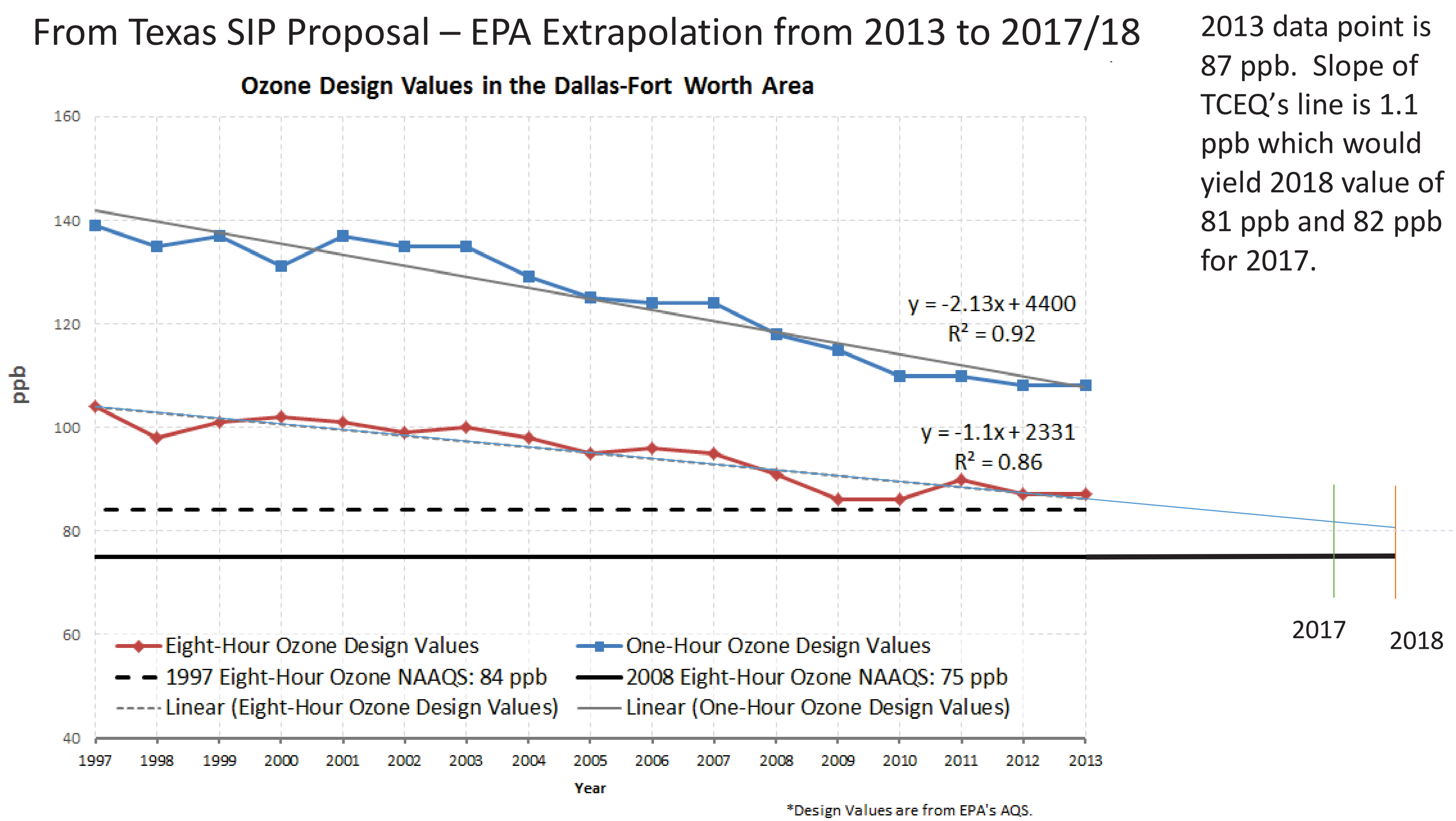
We note that there is some discussion of ERCs and DERCs in Appendix B of the proposal. That discussion indicates that there are 363 tpy of NOx ERCs and over 6000 tons of DERCs. Please clarify the calculation that resulted in 17 tpd of NOx being included in the model. Please explain and document how the NOx and VOC ERCs/DERCs were allocated in the modeling, including spatial allocation (daily DERC emissions plots). Also, please clarify if the attainment demonstration takes into account any emergency use of DERCs beyond the flow control limit (e.g., emergency use declared by ERCOT). It might be helpful to look at any past emergency usage of DERCs and generate a memo documenting past usage rates and whether or not the DFW area had any exceedances monitored on those days and provide that in the documentation.

Summary of Analysis of the Attainment Demonstration and WOE/Corroborative Analysis

We appreciate TCEQ's efforts to provide comprehensive modeling using an episode that includes additional days in attempt to provide representative modeling. As noted above, despite TCEQ efforts, there are concerns with model performance. There are also concerns that even with the additional episode days, the episode overall is not fully representative of the most difficult ozone scenarios. In addition, while current ozone trends and the model predictions support that ozone levels will continue to improve, it is not clear to EPA that these trends are sufficient for the area to attain by 2018.

Unfortunately, as discussed above, we anticipate that the attainment year ozone season for the DFW area will likely be 2017 rather than 2018. The attainment demonstration will need to be reworked to provide for attainment by 2017. EPA stands ready to work with TCEQ to develop streamlined modeling approaches and weight of evidence approaches for 2017. We note, however, that we believe it is likely that additional reductions will need to be included to demonstrate attainment.

Figure 1: Long term DFW 8-hour monitoring trends



2013 data point is 87 ppb. Slope of TCEQ's line is 1.1 ppb which would yield 2018 value of 81 ppb and 82 ppb for 2017.

Rule Project Number 2013-048-115-AI

Comments addressing Chapter 115 revisions to implement Reasonably Available Control Technology (RACT) for all emissions sources addressed in a control techniques guidelines (CTG) and all non-CTG major sources of VOCs in the DFW 2008 eight-hour ozone moderate nonattainment area (serious -- Collin, Dallas, Denton, Ellis, Johnson, Kaufman, Parker, Rockwall, and Tarrant, and moderate -- Wise).

1. Support for Revisions

   In general, we are supportive of this rule project to implement RACT for emissions sources of VOCs in the DFW ten county area.

2. Compliance Schedules for Wise County

   At the time of this review, Wise County is currently designated as nonattainment for the 2008 eight hour standard. Subchapter A Definitions, Section 115.119 (h), Compliance Schedules states: "Upon the date the commission publishes notice in the *Texas Register* that Wise County is no longer designated nonattainment for the 2008 Eight-Hour Ozone National Ambient Air Quality Standard, the owner or operator of each storage tank is not required to comply with any of the requirements in this division."

   This provision is not approvable as proposed because it does not contain a replicable procedure to change the applicability of a SIP requirement. EPA's designation of Wise County is currently under review in the D.C. Circuit Court of Appeals (*Mississippi Commission on Environmental Quality v. EPA*). We understand that the litigation outcome and potential subsequent rulemaking by EPA concerning Wise County are unknown at this time. Although we appreciate the commission's dilemma, if Wise County is no longer designated as nonattainment in the future, a publication by the commission in the Texas Register that Wise County is no longer designated nonattainment is not sufficient to change the applicability of requirements to sources in Wise County. Under CAA Section 110(i), this change would require a SIP revision submitted by TCEQ after completion of the State's rulemaking process.

   Phrasing similar to that quoted above occurs in multiple places throughout this proposed SIP revision and must also be revised:

   Subchapter B, General Volatile Organic Compounds Sources, Division 1: Storage of VOCs, §115.119(h), Compliance Schedules.

   Subchapter B, General Volatile Organic Compounds Sources, Division 2: Vent Gas Control, §115.129(g), Compliance Schedules.

   Subchapter B, General Volatile Organic Compounds Sources, Division 3: Water Separation, §115.139(e), Counties and Compliance Schedules.

   Subchapter C, Volatile Organic Compound Transfer Operations, Division 1: Loading and Unloading of Volatile Organic Compounds, §115.219(g) Counties and Compliance Schedules. Subchapter C, Volatile Organic Compound Transfer Operations, Division 2: Filling of Gasoline Storage Vessels (Stage 1) for Motor Vehicle Fuel Dispensing Facilities, §115.229(f) Counties and Compliance Schedules.

Subchapter C, Volatile Organic Compound Transfer Operations, Division 3: Control of Volatile Organic Compound Leads from Transport Vessels, §115.239(e) Counties and Compliance Schedules.

Subchapter D, Petroleum Refining, Natural Gas Processing, and Petrochemical Processes, Division 3: Fugitive Emission Control in Petroleum Refining, Natural Gas/Gasoline Processing, and Petrochemical Processes in Ozone Nonattainment Areas, §115.359(e) Counties and Compliance Schedules.

Subchapter E, Solvent-Using Processes, Division 2: Surface Coating Processes, §115.429(f) Counties and Compliance Schedules.

Subchapter E, Solvent-Using Processes, Division 4: Offset Lithographic Printing, §115.449(i) Counties and Compliance Schedules.

Subchapter E, Solvent-Using Processes, Division 5: Control Requirements for Surface Coating Processes, §115.459(d) Counties and Compliance Schedules.

Subchapter E, Solvent-Using Processes, Division 6: Industrial Cleaning Solvents, §115.469(d) Counties and Compliance Schedules.

Subchapter E, Solvent-Using Processes, Division 7: Miscellaneous Industrial Adhesives, §115.479(d) Compliance Schedules.

Subchapter F, Miscellaneous Industrial Sources, Solvent-Using Processes Division 1: Cutback Asphalt, §115.519(e) Compliance Schedules.

3. Definition of Dallas-Fort Worth area (Subchapter A Definitions, §115.10 (11))

The definition of the "Dallas-Fort Worth area" has been revised to refer to 3 different designations depending on the definition's applicability and based on the number of counties.

For clarity, we suggest creating three distinct definitions, such as (A) "Dallas-Fort Worth area, 4 counties," (B) "Dallas-Fort Worth area, 9 counties" and (C) "Dallas-Fort Worth area, 10 counties" so that the terms used in the subchapters and divisions provide information about which definition is intended. As currently proposed, the definition requires a person to cross reference particular subchapters and divisions with the definition section to determine what counties "Dallas Fort Worth area" includes in that context.

Alternatively, or possibly in addition, we suggest clarifying the definition of Dallas-Fort Worth area as it applies to a particular subchapter.

An example of a reference which is somewhat problematic may be found in Subchapter C, Volatile Organic Compound Transfer Operations, Division 1: Loading and Unloading of Volatile Organic Compounds (Subchapter C, §115.219(f) Counties and Compliance Schedules). Reviewing the definition of Dallas-Fort Worth in §115.10, this subchapter is not specifically delineated in definition (A) or (B), therefore it seems that the applicable definition is (C) for all 10 counties. However, in §115.219(f), we believe TCEQ intended this reference to the DFW area to include only 9 counties (§115.10(11)(B)) because there is a separate paragraph that provides requirements for Wise County, §115.219(e). There are additional instances similar to this throughout the revisions.

Project Number 2013-014-SIP-NR

Comments Addressing the Dallas-Fort Worth Reasonable Further Progress SIP Revision

We appreciate the detailed work submitted in the RFP plan. It appears that the RFP and contingency reductions are available, but not always shown accurately. We found mathematical errors in several tables. For example, in Table 3-12 (Post-2011 RFP Target level of VOC emission for Wise County), page 3-12 of the submittal: the VOC target for the 2018 attainment year would be 28.29 tpd (29.33 – 1.04 = 28.29), but Table 3-12 shows 28.30 tpd. This error is also reflected in Table 3-16, line 9 and in Appendix 1, on Sheet 16. There also appears to be an error made in calculating the creditable RFP control reductions in NOx for the nine previously designated counties between 2017 and 2018, shown on line 3 of Table 3-15. The sum of NOx reductions projected for 2017 is 864.23 (Table 4-1) and the sum of NOx reductions projected for 2018 is 901.79 (Table 4-2). The difference between these two sums is 37.56, but Table 3-15 shows 14.42. Please indicate where the additional 23.14 tpd in NOx emission reductions has been placed (37.56 – 14.42 = 23.14). We did not find errors in such calculations for the VOC emission reductions.

The titles for Tables 4-23 and 4-24 identify them as providing the RFP contingency demonstrations for the 2017 milestone year, but the dates within the tables are 2018. Additionally, we believe several of the numbers provided in these tables reflect emissions for 2018 rather than for 2017.

The Airport Emissions Inventory – Wise County is within the DFW MSA and has airports, but there is no mention of Wise County within the Airport EI. Wise County had not been proposed as a nonattainment area when the Airport EI was completed (August 2011), but neither had Hunt and Henderson Counties, which are included in the Airport EI. Please explain why Wise County is not included in the Airport EI.

Rule Project Number 2013-049-117-AI

Comments on the Proposed Revisions to 30 TAC Chapter 117

1. Sections 117.210(c), 117.225, 117.405(d), 117.410(d), 117.425, 117.1110(b), 117.1125, 117.1310(b), and 117.1325 pertain to control of ammonia and carbon monoxide emissions which are not ozone precursors, and are therefore not necessary components of Texas ozone SIP. As a result, EPA supports TCEQ for clearly identifying that these sections are not intended for inclusion into the EPA-approved Texas SIP.

2. EPA supports the inclusion of major sources of NOx located in Wise County to become subject to requirements of 30 TAC Chapter 117.

3. At the time of this review, Wise County is currently designated as nonattainment for the 2008 eight-hour ozone standard.

   Section 117.9030(a)(2) states: "Upon the date the commission publishes notice in the *Texas Register* that Wise County is no longer designated nonattainment for the 2008 Eight-Hour Ozone National Ambient Air Quality Standard, the owner or operator of a unit located at a major stationary source of NOX located in Wise County is not required to comply with the requirements of Subchapter B, Division 4 of this chapter." This provision is not approvable as proposed because it does not contain a replicable procedure to change the applicability of a SIP requirement. EPA's designation of Wise County is currently under review in the D.C. Circuit Court of Appeals (*Mississippi Commission on Environmental Quality v. EPA*). We understand that the litigation outcome and potential subsequent rulemaking by EPA concerning Wise County are unknown at this time. Although we appreciate the commission's dilemma, if Wise County is no longer designated as nonattainment in the future, a publication by the commission in the Texas Register that Wise County is no longer designated non-attainment is not sufficient to change the applicability of requirements to sources in Wise County. Under CAA Section 110(i), this change would require a SIP revision submitted by TCEQ after completion of the State's rulemaking process.

Part 70 Operating Permit

Permit Number: **4911-115-0003-V-03-0** **Effective Date:** **May 8, 2012**

Facility Name: **Hammond Steam-Electric Generating Plant**

Facility Address: 5963 Alabama Highway S.W.
Coosa, Georgia 30165 (Floyd County)

Mailing Address: 241 Ralph McGill Blvd. NE, Bin 10221
Atlanta, Georgia 30308

Parent/Holding Company: Southern Company/Georgia Power

Facility AIRS Number: 04-13-115-00003

In accordance with the provisions of the Georgia Air Quality Act, O.C.G.A. Section 12-9-1, et seq and the Georgia Rules for Air Quality Control, Chapter 391-3-1, adopted pursuant to and in effect under the Act, the Permittee described above is issued a Part 70 Permit for:

The operation of an electric utility plant including four steam generating units.

This Permit is conditioned upon compliance with all provisions of The Georgia Air Quality Act, O.C.G.A. Section 12-9-1, et seq, the Rules, Chapter 391-3-1, adopted and in effect under that Act, or any other condition of this Permit. Unless modified or revoked, this Permit expires five years after the effective date indicated above.

This Permit may be subject t to revocation, suspension, modification or amendment by the Director for cause including evidence of noncompliance with any of the above, for any misrepresentation made in Title V Application No. TV-19763 signed on June 25, 2010 any other applications upon which this Permit is based, supporting data entered therein or attached thereto, or any subsequent submittal of supporting data, or for any alterations affecting the emissions from this source.

This Permit is further subject to and conditioned upon the terms, conditions, limitations, standards, or schedules contained in or specified on the attached **56** pages.

[Signed]

Director
Environmental Protection Division

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PART 1.0 FACILITY DESCRIPTION

1.1 Site Determination

There are no applicable issues with regard to the site determination. There are no other facilities which could possibly be contiguous or adjacent and under common control.

1.2 Previous and/or Other Names

This facility is commonly known and referred to as Plant Hammond. No other names were identified.

1.3 Overall Facility Process Description

Plant Hammond burns fossil fuel to generate electricity. This facility includes four steam electric generating units which primarily burn coal. During normal operation, all four units designated as Source 3, exhaust to a Flue Gas Desulfurization (FGD) Scrubber FGD1 and then to a 675 ft stack that has one liner. During bypass, all four units exhaust through one 750 ft. stack which has two liners. Units 1, 2, and 3, which are designated as Source 1, exhaust through one of the stack liners and Unit 4, designated Source 2, exhausts through the other liner. In addition, Unit 4, the largest unit, has Selective Catalytic Reduction (SCR4) to reduce NOx emissions.

PART 2.0 REQUIREMENTS PERTAINING TO THE ENTIRE FACILITY

2.1 Facility Wide Emission Caps and Operating Limits

None applicable.

2.2 Facility Wide Federal Rule Standards

None applicable.

2.3 Facility Wide SIP Rule Standards

None applicable.

2.4 Facility Wide Standards Not Covered by a Federal or SIP Rule and Not Instituted as an Emission Cap or Operating Limit

None applicable.

PART 3.0 REQUIREMENTS FOR EMISSION UNITS

Note: Except where an applicable requirement specifically states otherwise, the averaging times of any of the Emissions Limitations or Standards included in this permit are tied to or based on the run time(s) specified for the applicable reference test method(s) or procedures required for demonstrating compliance.

3.1 Emission Units

Emission Units		Specific Limitations/Requirements		Air Pollution Control Devices	
ID No.	**Description**	**Applicable Requirements/Standards**	**Corresponding Permit Conditions**	**ID No.**	**Description**
SG01	Steam Generator Unit 1	391-3-1-.02(2)(b), 391-3-1-.02(2)(d), 391-3-1-.02(2)(g), 391-3-1-.02(2)(jjj), 391-3-1-.02(2)(sss), 391-3-1-.02(2)(uuu), Acid Rain, CAIR, 40 CFR 63 Subpart A, 40 CFR 63 Subpart UUUUU	3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.1, 3.4.2, 3.4.3, 3.4.6, 3.4.7, 3.4.8, 3.4.9, 3.4.10, Section 7.9, Section 7.15	EP01 FGD1	Electrostatic Precipitator Flue Gas Desulfurization
SG02	Steam Generator Unit 2	391-3-1-.02(2)(b), 391-3-1-.02(2)(d), 391-3-1-.02(2)(g), 391-3-1-.02(2)(jjj), 391-3-1-.02(2)(sss), 391-3-1-.02(2)(uuu), Acid Rain, CAIR, 40 CFR 63 Subpart A, 40 CFR 63 Subpart UUUUU	See SG01	EP02 FGD1	Electrostatic Precipitator Flue Gas Desulfurization
SG03	Steam Generator Unit 3	391-3-1-.02(2)(b), 391-3-1-.02(2)(d), 391-3-1-.02(2)(g), 391-3-1-.02(2)(jjj), 391-3-1-.02(2)(sss), 391-3-1-.02(2)(uuu), Acid Rain, CAIR, 40 CFR 63 Subpart A, 40 CFR 63 Subpart UUUUU	See SG01	EP03 FGD1	Electrostatic Precipitator Flue Gas Desulfurization
SG04	Steam Generator Unit 4	391-3-1-.02(2)(b), 391-3-1-.02(2)(d), 391-3-1-.02(2)(g), 391-3-1-.02(2)(jjj), 391-3-1-.02(2)(sss), 391-3-1-.02(2)(uuu), Acid Rain, CAIR, 40 CFR 63 Subpart A, 40 CFR 63 Subpart UUUUU	3.2.1, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.1, 3.4.2, 3.4.3, 3.4.6, 3.4.7, 3.4.8, 3.4.9, 3.4.10, Section 7.9, Section 7.15	EP04 SCR4 FGD1	Electrostatic Precipitator Selective Catalytic Reduction Flue Gas Desulfurization
CHS	Coal Handling System	391-3-1-.02(2)(n)	3.4.4, 3.4.5	none	n/a
AHS	Ash Handling System	391-3-1-.02(2)(n)	3.4.4, 3.4.5	none	n/a
MHS	Materials Handling System	391-3-1-.02(2)(n)	3.4.4, 3.4.5	none	n/a

* Generally applicable requirements contained in this permit may also apply to emission units listed above.

3.2 Equipment Emission Caps and Operating Limits

3.2.1 The Permittee shall not fire any fuel other than coal or natural gas in the Plant Hammond steam generating units (emission unit IDs SG01, SG02, SG03 and SG04) except for the following:
[391-3-1-.03(2)(c)]

a. No. 2 fuel oil, biodiesel, and biodiesel blends may be burned for start-up, shutdown, to assist in achieving peak load, and flame stabilization.

b. Sawdust may be blended and fired with the coal.

c. Biomass may be blended and fired with the coal. Biomass, as used in this permit, shall include, but not be limited to paper, vegetative matter, or wood chips. Biomass shall not include sawdust (sawdust is covered by 3.2.1(b)) or municipal solid waste except as may be specifically listed above.

d. Used oil, as indicated in Condition 3.2.2, may be burned.

e. Coal-derived synthetic fuel, manufactured using a binder with mercury of content less than or equal to 0.2 ppm on a dry basis and the binder constitutes approximately 2.5% by weight or less of the coal-derived synthetic fuel shall be considered coal for the purpose of this permit.

3.2.2 The Permittee shall not burn used oil in any Plant Hammond steam generating unit (emission unit IDs SG01, SG02, SG03, or SG04) during periods of startup or shutdown. For the purposes of this permit, startup shall be defined as the period lasting from the time the first oil fire is established in the furnace until the time the mill/burner performance and secondary air temperature are adequate to maintain an exiting gas temperature above the sulfuric acid dew point. The term shutdown means the cessation of the operation of a source or facility for any purpose.
[391-3-1-.03(2)(c)]

NOx Emission Limits for the 7-Plant Plan

3.2.3 The Permittee shall not discharge, or cause the discharge, into the atmosphere NOx emissions, including emissions occurring during startup and shutdown, from the combined operations of all affected units (emission unit IDs SG01, SG02, SG03, SG04 at Plant Bowen (AFS No. 015-00011); SG01, SG02, SG03, SG04 at Plant Branch (AFS No. 237-00008); SG01, SG02, SG03, SG04 at Plant Hammond (AFS No. 115-00003); SGM1, SGM2 at Plant McDonough (AFS No. 067-00003); SG01, SG02, SG03, SG04 at Plant Scherer (AFS No. 207-00008); SG01, SG02 at Plant Wansley (AFS No. 149-00001); and SG01, SG02, SG03, SG04, SG05, SG06, SG07 at Plant Yates (AFS No. 077-00001)) in excess of 32,335.8 tons during the ozone season. For purposes of this permit, the ozone season shall be defined as May 1 through September 30.
[391-3-1-.03(8)(c)1 and 391-3-1-.03(8)(c)15]

State Only Enforceable Condition

3.2.4 The Permittee shall not operate each unit unless units SG01, SG02 and SG03 are equipped and operated with flue gas desulfurization and unit SG04 is equipped and operated with selective catalytic reduction and flue gas desulfurization, except the Permittee is not required to operate the required control technology under the following conditions: [391-3-1-.02(2)(sss)]

a. Restarting an EGU when all Electric Steam Generating Units are down and off-site power is not available (also known as a "Black Start").

b. Periods of startup of an EGU provided that such periods are consistent with the requirements outlined in the Georgia Rules for Air Quality Control 391-3-1-.02(2)(a)7.

c. Periods of shutdown of an EGU provided that such periods are consistent with the requirements outlined in the Georgia Rules for Air Quality Control 391-3-1-.02(2)(a)7.

d. Periods of scheduled and/or preventative maintenance of control technology equipment if such maintenance cannot reasonably be performed during a scheduled outage of the respective EGU.

e. Periods of malfunction of EGU and/or control technology equipment provided that such periods are consistent with the requirements of paragraph 391-3-1-.02(2)(a)7.

f. Periods when the owner/operator is required to conduct the Relative Accuracy Test Audit and any other necessary periodic quality assurance procedures on the Continuous Emissions Monitoring System located on the bypass stack pursuant to 40 CFR Part 75, or the Georgia Department of Natural Resources Procedures for Testing and Monitoring Sources of Air Pollutants.

g. Periods when the owner/operator is required to conduct any performance tests on the bypass stack as required by state or federal air quality rules, air quality operating permits, or as ordered by the Division.

h. Division approved periods of research and development of emission control technologies, provided that the unit does not exceed other applicable emission limits. For purposes of this subparagraph, the owner/operator shall submit a request for approval under this subparagraph at least 120 days prior to such date as well as including the following items: (1) length of time of research and development (R&D) period; (2) identification of steps to take to minimize emissions in accordance with best operational practices during R&D period; (3) for periods of R&D lasting more than 48 hours during any 5-day period, a demonstration that any increase in emissions resulting from the R&D project that are above that which is allowed by this subparagraph (sss) will not cause or significantly contribute to a violation of any national ambient air quality standard or prevent compliance with any other applicable provisions .

i. Any other occasion not covered by subparagraph a through h as approved by the Division.

3.3 Equipment Federal Rule Standards

3.3.1 The Permittee shall comply with all applicable provisions of the "National Emission Standards for Hazardous Air Pollutants" as found in 40 CFR 63, Subpart A, "General Provisions" and 40 CFR 63, Subpart UUUUU, "National Emission Standards for Hazardous Air Pollutants from Coal and Oil-Fired Electric Utility Steam Generating Units" for operation of steam generating units (emission unit IDs SG01, SG02, SG03, and SG04).
[40 CFR 63, Subparts A and UUUUU]

3.4 Equipment SIP Rule Standards

3.4.1 The Permittee shall not discharge or cause the discharge into the atmosphere from any Plant Hammond steam generating unit (emission unit IDs SG01, SG02, SG03, or SG04) any gases which contain particulate matter in excess of 0.24 lb/mmBtu heat input.
[391-3-1-.02(2)(d)1(iii)]

3.4.2 The Permittee shall not discharge or cause the discharge into the atmosphere from any steam generating unit (emission unit IDs SG01, SG02, SG03, or SG04), or steam generating source, any gases which exhibit opacity equal to or greater than 40 percent.
[391-3-1-.02(2)(b)]

3.4.3 The Permittee shall not fire any fuel in any steam generating unit (emission unit IDs SG01, SG02, SG03, or SG04) that contains greater than 3.0 percent sulfur, by weight.
[391-3-1-.02(2)(g)2]

Coal, Ash and Material Handling Requirements

3.4.4 The Permittee shall take all reasonable precautions with the coal handling system (Emission Unit ID CHS), the ash handling system (Emission Unit ID AHS), and the materials handling system (Emission Unit ID MHS) to prevent fugitive dust from these operations from becoming airborne.
[391-3-1-.02(2)(n)1]

3.4.5 The percent opacity from the coal handling system (emission unit ID CHS), the ash handling system (Emission Unit ID AHS), and the materials handling system (Emission Unit ID MHS) shall not equal or exceed 20 percent.
[391-3-1-.02(2)(n)2]

NOx Emission Limits Per Georgia Rule (jjj)

3.4.6 Except as indicated in Condition Nos. 3.4.8 and 3.4.9, the Permittee shall not discharge, or cause the discharge, into the atmosphere from steam generating units (emission unit ID SG01, SG02, SG03 and SG04) at Plant Hammond (AFS No. 115-00003), a common stack rate (*CS-rate*) expressed in pounds per million Btu (lb/MMBtu) of NOx emissions in excess of

a. $CS - T\arg et(lb/MMBtu) = \left[\dfrac{0.42HI_{1,2,3} + 0.07HI_4}{HI_{1,2,3,4}}\right]$

Where:

CS-Target (lb/MMBtu) is the target NOx emission rate from the combined stack on a lb/MMBtu basis.

$HI_{1,2,3}$ is the combined heat input from steam generating units SG01, SG02, and SG03, collectively called Source 1 in units of MMBtu.

HI_4 is the heat input from steam generating unit SG04 called Source 2 in units of MMBtu.

$HI_{1,2,3,4}$ is the combined heat input from steam generating units SG01, SG02, SG03 and SG04 in units of MMBtu.

b. Verify Common Stack Rate (30 day rolling avg) is less than the "Target NOx Rate"

$$CS - rate(lb/MMBtu) \prec CS - T\arg et$$

This shall apply during the period May 1 through September 30 of each calendar year.
[391-3-1-.02(2)(jjj)3(i)]

3.4.7 If the Permittee does not comply with Condition No. 3.4.6, the Permittee shall demonstrate that NOx emissions, averaged over all affected units (emission unit IDs SG01, SG02, SG03, SG04 at Plant Bowen (AFS No. 015-00011); SG01, SG02, SG03, SG04 at Plant Hammond (AFS No. 115-00003); SGM1, SGM2 at Plant McDonough (AFS No. 067-00003); SG01, SG02 at Plant Wansley (AFS No. 149-00001); and SG01, SG02, SG03, SG04, SG05, SG06, SG07 at Plant Yates (AFS No. 077-00001)), do not exceed 0.13 lb/MMBtu heat input on a 30-day rolling averaging period. This shall apply during the period May 1 through September 30 of each year.
[391-3-1-.02(2)(jjj)3(ii)]

3.4.8 If the Permittee does not comply with Condition No. 3.4.6, the Permittee shall demonstrate that NOx emissions, averaged over all affected units (emission unit IDs SG01, SG02, SG03 and SG04 at Plant Bowen (AFS No. 015-00011); SG01, SG02, SG03, SG04 at Plant Branch (AFS No. 237-00008); SG01, SG02, SG03, SG04 at Plant Hammond (AFS No. 115-00003); SGM1, SGM2 at Plant McDonough (AFS No. 067-00003); SG01, SG02, SG03, SG04 at Plant Scherer (AFS No. 207-00008); SG01, SG02 at Plant Wansley (AFS No. 149-00001); and SG01, SG02, SG03, SG04, SG05, SG06, SG07 at Plant Yates (AFS No. 077-00001)), do not exceed 0.18 lb/MMBtu heat input on a 30-day rolling averaging period. This shall apply during the period May 1 through September 30 of each year.
[391-3-1-.02(2)(jjj)5(ii)]

3.4.9 Except of periods indicated in Condition No. 3.4.10, the Permittee shall not discharge, or cause the discharge, into the atmosphere from Plant Hammond steam generating units (emission unit IDs SG01, SG02, SG03 and SG04) (AIRS No. 115-00003), any gases which contain SO_2 emissions in excess of 5 percent (0.05) of the potential combustion concentration on a 30-day rolling average basis.
[391-3-1-.02(2)(uuu)2]

3.4.10 For purposes of this permit, requirements in Condition 3.4.9 do not apply during the following periods.
[391-3-1-.02(2)(uuu)4]

a. Restarting an EGU when all Electric Steam Generating Units at the facility are down and off-site power is not available (also known as a “Black Start”).

b. Periods of startup of an Electric Utility Steam Generating Unit provided that such periods are consistent with the requirements outlined in the Georgia Rules for Air Quality Control 391-3-1-.02(2)(a)7.

c. Periods of shutdown of an Electric Utility Steam Generating Unit provided that such periods are consistent with the requirements outlined in the Georgia Rules for Air Quality Control 391-3-1-.02(2)(a)7.

d. Periods of scheduled and/or preventative maintenance of control technology equipment if such maintenance cannot reasonably be performed during a scheduled outage of the respective Electric Utility Steam Generating Unit.

e. Periods of malfunction of an Electric Utility Steam Generating Unit and/or control technology equipment provided that such periods are consistent with the requirements outlined in the Georgia Rules for Air Quality Control 391-3-1-.02(2)(a)7.

f. Periods when the Permittee is required to conduct the Relative Accuracy Test Audit (RATA) and any other necessary periodic quality assurance procedures on the Continuous Emissions Monitoring System (CEMS) located on the bypass stack pursuant to 40 CFR Part 75 or the Division’s **Procedures for Testing and Monitoring Sources of Air Pollutants**.

g. Periods when the Permittee is required to conduct any performance testing on the bypass stack as required by State or Federal air quality rules, air quality operating permits or at the request of the Division.

h. Division-approved periods of research and development of emission control technologies provided that the unit does not exceed other applicable emission limits. For purposes of this condition, the Permittee shall submit a request for approval at least 120 days prior to such date, as well as include the following items: (1) length of time of research and development (R&D) period; (2) identification of steps to take to minimize emissions in accordance with best operational practices during R&D period; (3) for periods of R&D lasting more than 48 hours during any 5-day period, a demonstration that any increase in emissions resulting from the R&D project that are above that which is allowed by this subparagraph (uuu) will not cause or significantly contribute to a violation of any National Ambient Air Quality Standard or prevent compliance with any other applicable provisions.

3.5 Equipment Standards Not Covered by a Federal or SIP Rule and Not Instituted as an Emission Cap or Operating Limit

None Applicable.

PART 4.0 REQUIREMENTS FOR TESTING

4.1 General Testing Requirements

4.1.1 The Permittee shall cause to be conducted a performance test at any specified emission unit when so directed by the Environmental Protection Division ("Division"). The test results shall be submitted to the Division within 60 days of the completion of the testing. Any tests shall be performed and conducted using methods and procedures that have been previously specified or approved by the Division.
[391-3-1-.02(6)(b)1(i)]

4.1.2 The Permittee shall provide the Division thirty (30) days (or sixty (60) days for tests required by 40 CFR Part 63) prior written notice of the date of any performance test(s) to afford the Division the opportunity to witness and/or audit the test in accordance with Division guidelines.
[391-3-1-.02(3)(a) and 40 CFR 63.7(b)(1)]

4.1.3 Performance and compliance tests shall be conducted and data reduced in accordance with applicable procedures and methods specified in the Division's Procedures for Testing and Monitoring Sources of Air Pollutants. The methods for the determination of compliance with emission limits listed under Sections 3.2, 3.3, 3.4 and 3.5 are as follows:

a. Method 1 for the determination of sample point locations,

b. Method 2 for the determination of stack gas flow rate,

c. Method 3 or 3A for the determination of stack gas molecular weight,

d. Method 3A or 3B for the determination of the emissions rate correction factor for excess air,

e. Method 4 for the determination of stack gas moisture,

f. Method 5 or Method 17, as applicable, for the determination of particulate matter concentration,

g. Method 6 or 6C for the determination of sulfur dioxide concentration,

h. Method 9 and the procedures contained in Section 1.3 of the above referenced document for the visual determination of opacity,

i. Method 19, when applicable, to convert particulate matter, carbon monoxide, sulfur dioxide, and nitrogen oxide concentrations (i.e., grains/dscf for PM, ppm for gaseous pollutants), as determined using other methods specified in this section, to emission rates (i.e., lb/MMBtu)

j. The procedures contained in Section 2.116.2 of the above-referenced document shall be used for the determination of nitrogen oxides concentration from the steam generating units with emission units ID Nos. SG01, SG02, SG03, and SG04 for purposes of verifying compliance with Georgia Rule 391-3-1-.02(2)(jjj),

k. Method 7E for the determination of nitrogen oxides concentration for the purposes other than verifying compliance with Georgia Rule 391-3-1-.02(2)(jjj),

l. The procedures contained in Section 2.125.4 of the above-referenced document shall be used for the determination of sulfur dioxide emission rates from Source 3 comprised of the steam generating units with emission units ID Nos. SG01, SG02, SG03, and SG04, located in the 675 ft stack for purposes of verifying compliance with Georgia Rule 391-3-1-.02(2)(uuu).

Minor changes in methodology may be specified or approved by the Director or his designee when necessitated by process variables, changes in facility design, or improvement or corrections that, in his opinion, render those methods or procedures, or portions thereof, more reliable.
[391-3-1-.02(3)(a)]

State Only Enforceable Condition

4.1.4 The Permittee shall provide, with the notification required under Condition 4.1.2, a test plan in accordance with Division guidelines.
[391-3-1-.02(3)(a)]

4.2 Specific Testing Requirements

4.2.1 The Permittee shall conduct the following performance tests(s) on the following emissions units at the frequency specified:

a. Particulate matter emission tests on Steam Generating Units 1, 2 and 3 scrubber bypass stack (ST01, combined liner for SG01, SG02 and SG03) and on Steam Generating Unit 4 scrubber bypass stack (ST02, liner for SG04). The tests shall be conducted within 30 days following the 8760 bypass operating hours or 5 years, whichever comes first.
[391-3-1-.02(6)(b)1(i)]

b. Particulate matter emission tests on Steam Generating Units 1, 2, 3 and 4 (ST03, combined scrubber stack for emission unit IDs SG01, SG02, SG03 and SG04). The tests shall be conducted annually at approximately twelve month intervals not to exceed thirteen months between tests. The Permittee may, if the test results from the previous annual test is fifty percent or less of the limitation in Condition 3.4.1, request that testing be deferred for a period no greater than twelve months from the required annual test date. Such request shall be in written form at least thirty days prior to the scheduled test.
[391-3-1-.02(6)(b)1(i)]

4.2.2 The Permittee shall conduct the following performance test(s) on the following emissions units at the frequency specified:

a. An initial and subsequent performance tests for sulfur dioxide emissions from Source 3 comprised of the steam generating units with emission units ID Nos. SG01, SG02, SG03 and SG04, located in the 675 ft stack.

The initial performance test is based upon the 95 percent reduction required by Condition 3.4.9 for the first 30 successive boiler operating days following January 1, 2012. The initial performance test is to be scheduled so that the first day of the 30 successive operating days is completed upon the first boiler operating day on or after January 1, 2012. A separate performance test is completed at the end of each boiler operating day after the initial performance test, and a new 30-day percent reduction for Sulfur Dioxide (SO_2) is calculated to show compliance with Condition 3.4.9. Compliance with applicable percent reduction requirements is determined based on the average inlet and outlet emission rates for the 30 successive boiler operating days. If the Permittee has not obtained the minimum quantity of emission data as required under Section 2.125.3(d) of the Division's **Procedures for Testing and Monitoring Sources of Air Pollutants**, compliance of the affected facility with the emission requirements required by Condition 3.4.9 for the day on which the 30-day period ends may be determined by the Director by following the applicable procedures in Section 12.7 of Method 19 of Appendix A of the **Procedures for Testing and Monitoring Sources of Air Pollutants.**
[391-3-1-.02(6)(b)1(i) and PTM Section 2.125]

PART 5.0 REQUIREMENTS FOR MONITORING (Related to Data Collection)

5.1 General Monitoring Requirements

5.1.1 Any continuous monitoring system required by the Division and installed by the Permittee shall be in continuous operation and data recorded during all periods of operation of the affected facility except for continuous monitoring system breakdowns and repairs. Monitoring system response, relating only to calibration checks and zero and span adjustments, shall be measured and recorded during such periods. Maintenance or repair shall be conducted in the most expedient manner to minimize the period during which the system is out of service.
[391-3-1-.02(6)(b)1]

5.2 Specific Monitoring Requirements

5.2.1 The Permittee shall install, calibrate, maintain, and operate a system to continuously monitor and record the indicated pollutants on the following equipment. Each system shall meet the applicable performance specification(s) of the Division's monitoring requirements.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

a. A continuous opacity monitoring system (COMS) on Steam Generating Units 1, 2, and 3 (SG01, SG02, and SG03, combined exhaust) and on Steam Generating Unit 4 (SG04) located in each liner (ST01 and ST02) of the scrubber bypass stack.

b. A Continuous Emissions Monitoring System (CEMS), for the measurement of nitrogen oxides concentration (ppm) and diluent concentrations (either Oxygen or Carbon Dioxide, percent), on Source 1 comprised of electric utility steam generating unit with emission unit ID Nos. SG01, SG02 and SG03, combined exhaust, located in the corresponding liner (ST01) of the scrubber bypass stack. The output of the CEMS shall be expressed in terms of pounds per million British thermal units (lb/MMBtu).

c. A Continuous Emissions Monitoring System (CEMS), for the measurement of nitrogen oxides concentration (ppm) and diluent concentrations (either Oxygen or Carbon Dioxide, percent), on Source 2 comprised of electric utility steam generating unit with emission unit ID No. SG04, located in the corresponding liner (ST02) of the 750 ft scrubber bypass stack. The output of the CEMS shall be expressed in terms of pounds per million British thermal units (lb/MMBtu).

d. A Continuous Emissions Monitoring System (CEMS), for the measurement of nitrogen oxides concentration (ppm) and diluent concentrations (either Oxygen or Carbon Dioxide, percent), on Source 3 comprised of electric utility steam generating units with emission unit ID Nos. SG01, SG02, SG03 and SG04, combined exhaust, located in the 675 foot scrubber stack (ST03). The output of the CEMS shall be expressed in terms of pounds per million British thermal units (lb/MMBtu).

e. A Continuous Monitoring System (CMS), for the measurement of the ESP power (control device IDs EP01, EP02, EP03, EP04) and to indicate when less than 6 recycle pumps are running on the FGD (control device ID FGD1) for Units 1, 2, 3 and 4 (Emission Unit ID Nos. SG01, SG02, SG03 and SG04).

f. A continuous emissions monitoring system (CEMS) for the measurement of sulfur dioxide concentration (ppm) and diluent concentrations (either Oxygen or Carbon Dioxide, percent), on Source 1 comprised of electric utility steam generating unit with emission unit ID Nos. SG01, SG02, and SG03, combined exhaust, located in the corresponding liner of the 750 foot bypass stack. The output of the CEMS shall be expressed in terms of pounds per million British thermal units (lb/MMBtu).

g. A continuous emissions monitoring system (CEMS) for the measurement of sulfur dioxide concentration (ppm) and diluent concentrations (either Oxygen or Carbon Dioxide, percent), on Source 2 comprised of electric utility steam generating unit with emission unit ID No. SG04, located in the 750 foot bypass stack. The output of the CEMS shall be expressed in terms of pounds per million British thermal units (lb/MMBtu).

h. A continuous monitoring system (CEMS) for the measurement of sulfur dioxide concentration (ppm) and diluent concentrations (either Oxygen or Carbon Dioxide, percent), on Source 3 comprised of electric utility steam generating units with emission unit Nos. SG01, SG02, SG03, and SG04, combined inlet, located in the FGD inlet duct, and combined outlet, located in the FGD outlet stack. The output of the CEMS shall be expressed in terms of pounds per million British thermal units (lb/MMBtu).

State Only Enforceable Condition.

5.2.2 The Permittee shall, upon written request by the Division, analyze any used oil to be burned in Steam Generating Units (emission unit IDs SG01, SG02, SG03, and SG04). The sample(s) shall be obtained and analyzed using the following methods:
[391-3-1-.02(6)(b)1.(i)]

a. The procedures described in U.S. Environmental Protection Agency document EPA-600/2-80-018 (Samplers and Sampling Procedures for Hazardous Waste Streams) shall be used to obtain the sample.

b. Method 6010B, contained in the SW-846 methods manual of U.S. Environmental Protection Agency's Office of Solid Waste, shall be used to determine concentrations of arsenic, cadmium, chromium, and lead.

c. SW-846 Method 9077C shall be used to determine total halogens.

d. ASTM D 93 shall be used to determine flash point.

e. Polychlorinated Biphenyls (PCB) shall be determined using the test method described in U.S. Environmental Protection Agency Document EPA-600/4-81-045 (*The Determination of Polychlorinated Biphenyls in Transformer Fluid and Waste Oil*).

5.2.3 The following pollutant specific emission unit(s) (PSEU) is/are subject to the Compliance Assurance Monitoring (CAM) Rule in 40 CFR 64.

Emission Unit	Pollutant
Steam Generating Unit 1 (SG01)	Particulate Matter
Steam Generating Unit 2 (SG02)	Particulate Matter
Steam Generating Unit 3 (SG03)	Particulate Matter
Steam Generating Unit 4 (SG04)	Particulate Matter

Permit conditions in this permit for the PSEU(s) listed above with regulatory citation 40 CFR 70.6(a)(3)(i) are included for the purpose of complying with 40 CFR 64. In addition, the Permittee shall meet the requirements, as applicable, of 40 CFR 64.7, 64.8, and 64.9.
[40 CFR 64]

5.2.4 The Permittee shall comply with the performance criteria listed in the table below for the particulate matter emissions from steam generating units SG01, SG02, and SG03 during scrubber bypass:
[40 CFR 64.6(c)(1)(iii)]

Performance Criteria [64.4(a)(3)]	**Indicator No. 1** **Opacity from scrubber bypass stack (Source 1) (ST01, combined liner for SG01, SG02 and SG03)**
A. Data Representativeness [64.3(b)(1)]	The continuous opacity monitoring system (COMS) is located in the SG01, SG02, and SG03 combined liner. The COMS was installed at a representative location in the 750 ft bypass stack per 40 CFR 60, Appendix B, PS-1.
B. Verification of Operational Status (new/modified monitoring equipment only) [64.3(b)(2)]	Not applicable.
C. QA/QC Practices and Criteria [64.3(b)(3)]	The COMS was initially installed and evaluated per PS-1. Zero and span drift are checked daily and a quarterly filter audit is performed.
D. Monitoring Frequency [64.3(b)(4)]	The opacity is monitored continuously.
E. Data Collection Procedures [64.3(b)(4)]	The data acquisition system (DAS) retains all 6-minute opacity data.
F. Averaging Period [64.3(b)(4)]	The 6-minute opacity data is used to calculate 3-hour block averages.

5.2.5 The Permittee shall comply with the performance criteria listed in the table below for the particulate matter emissions from steam generating unit SG04 during scrubber bypass: [40 CFR 64.6(c)(1)(iii)]

Performance Criteria [64.4(a)(3)]	**Indicator No. 1** **Opacity from scrubber bypass stack (Source 2) (ST02, liner for SG04)**
A. Data Representativeness [64.3(b)(1)]	The continuous opacity monitoring system (COMS) is located in the SG04 liner. The COMS was installed at a representative location in the stack per 40 CFR 60, Appendix B, PS-1.
B. Verification of Operational Status (new/modified monitoring equipment only) [64.3(b)(2)]	Not applicable.
C. QA/QC Practices and Criteria [64.3(b)(3)]	The COMS was initially installed and evaluated per PS-1. Zero and span drift are checked daily and a quarterly filter audit is performed.
D. Monitoring Frequency [64.3(b)(4)]	The opacity is monitored continuously.
E. Data Collection Procedures [64.3(b)(4)]	The data acquisition system (DAS) retains all 6-minute opacity data.
F. Averaging Period [64.3(b)(4)]	The 6-minute opacity data is used to calculate 3-hour block averages.

5.2.6 The Permittee shall, at all times, maintain the monitoring required by Conditions 5.2.4 and 5.2.5, including but not limited to, maintaining necessary parts for routine repairs of the monitoring equipment.
[40 CFR 64.7(b)]

5.2.7 Except for, as applicable, monitoring malfunctions, associated repairs, and required quality assurance or control activities (including, as applicable, calibration checks and required zero and span adjustments), the Permittee shall conduct all monitoring in continuous operation (or shall collect data at all required intervals) at all times that the pollutant-specific emissions unit is operating. Data recorded during monitoring malfunctions, associated repairs, and required quality assurance or control activities shall not be used for purposes of CAM, including data averages and calculations, or fulfilling a minimum data availability requirement, if applicable. The Permittee shall use all the data collected during all other periods in assessing the operation of the control device and associated control system. A monitoring malfunction is any sudden, infrequent, not reasonably preventable failure of the monitoring to provide valid data. Monitoring failures that are caused in part by poor maintenance or careless operation are not malfunctions.
[40 CFR 64.7(c)]

5.2.8 Upon detecting an excursion or exceedance as defined in Condition 6.1.7, the Permittee shall restore operation of the pollutant-specific emissions unit (including the control device and associated capture system) to its normal or usual manner of operation as expeditiously as practicable in accordance with good air pollution control practices for minimizing emissions. The response shall include minimizing the period of any startup, shutdown or malfunction and taking any necessary corrective actions to restore normal operation and prevent the likely recurrence of the cause of an excursion or exceedance (other than those caused by excused startup or shutdown conditions). Such actions may include initial inspection and evaluation, recording that operations returned to normal without operator action (such as through response by a computerized distribution control system), or any necessary follow-up actions to return operation to within the indicator range, designated condition, or below the applicable emission limitation or standard, as applicable. Determination of whether the Permittee has used acceptable procedures in response to an excursion or exceedance will be based on information available, which may include but is not limited to, monitoring results, review of operation and maintenance procedures and records, and inspection of the control device, associated capture system, and the process.
[40 CFR 64.7(d)(1) and (2)]

5.2.9 If the Permittee identifies a failure to achieve compliance with an emission limitation or standard for which the approved monitoring in Conditions 5.2.4 and 5.2.5 and 5.2.10 did not provide an indication of an excursion or exceedance while providing valid data, or the results of compliance or performance testing document a need to modify the existing indicator ranges or designated conditions, the Permittee shall promptly notify the permitting authority and, if necessary, submit a proposed modification to the part 70 or 71 permit to address the necessary monitoring changes. Such a modification may include, but is not limited to, reestablishing indicator ranges or designated conditions, modifying the frequency of conducting monitoring and collecting data, or the monitoring of additional parameters.
[40 CFR 64.7(e)]

5.2.10 The Permittee shall comply with the performance criteria listed in the table below for the particulate matter emissions from steam generating units SG01, SG02, SG03 and SG04 during scrubber operations (Control device ID FGD1 and scrubber stack (ST03)).
[40 CFR 64.6(c)(1)(iii)]

Performance Criteria [64.4(a)(3)]	**Indicator No. 1 (Source 3) (ST03, scrubber stack)** **EP01 power, EP02 power and EP03 power at 15 KW and EP04 power at 30 KW as 3-hour block averages**	**Indicator No. 2 (Source 3) (ST03, scrubber stack)** **Number of FGD1 recycle pumps running and minimum rpm detected**
A. Data Representativeness [64.3(b)(1)]	The ESP power is measured as an indicator of particulate matter collection and equipment performance.	The number of FGD1 recycle pumps running and minimum rpm detected is an indicator of particulate matter collection and equipment performance.
B. Verification of Operational Status (new/modified monitoring equipment only) [64.3(b)(2)]	The total ESP power is a summation of the individual Transformer Rectifier powers. The individual TR controls are calibrated with test meters to verify accuracy.	Proper operation of recycle motors and pumps is verified during initial startup. Alarms are installed to verify continuous proper operation.
C. QA/QC Practices and Criteria [64.3(b)(3)]	The ESP controls are calibrated as per manufacturer's recommendations.	The FGD1 controls are calibrated as per manufacturer's recommendations.
D. Monitoring Frequency [64.3(b)(4)]	The ESP power is monitored continuously.	The number of FGD1 recycle pumps running is monitored continuously by measuring the breaker contact closure for each pump motor and the RPMs for each pump.
E. Data Collection Procedures [64.3(b)(4)]	The data acquisition system (DAS) retains all 3-hour average ESP power data.	The data acquisition system (DAS) retains all 3-hour average number of FGD1 recycle pumps running data.
F. Averaging Period [64.3(b)(4)]	The 1-minute data is used to calculate 3-hour block averages.	The 1-minute data is used to calculate 3-hour averages.

5.2.11 The CEMS required by Conditions 5.2.1f, and 5.2.1g shall be operated and data recorded during all periods of operation of Source 1 or Source 2, through their corresponding liners in the 750 ft bypass stack, including periods of startup, shutdown, malfunction or emergency conditions, except for CEMS breakdowns, repairs, calibration checks, and zero and span adjustments.

The CEMS required by Condition 5.2.1h shall be operated and data recorded during all periods of operation of Source 3 through the 675 ft FGD stack, including periods of startup, shutdown, malfunction or emergency conditions, except for CEMS breakdowns, repairs, calibration checks, and zero and span adjustments and any operating period allowed under Condition 3.4.10.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

5.2.12 The Permittee shall obtain SO_2 emission data for at least 75 percent of all operating hours for each 30 successive boiler operating days. The 1-hour averages required under Section 1.4(h) of the Division's **Procedures for Testing and Monitoring Sources of Air Pollutants** are expressed in ng/J (lb/MMBTU) heat input and used to calculate the average emission rates under Georgia Rule 391-3-1-.02(2)(uuu). The 1-hour averages are calculated using the data points required under Section 1.4(h)(2) of the referenced document. If the minimum data requirement of this condition is not met, the Permittee may use the procedures of Section 2.125.3(f) of the Division's **Procedures for Testing and Monitoring Sources of Air Pollutants** to supplement the data collected.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

5.2.13 The Permittee is required to prepare and submit to the Division for approval a unit specific monitoring plan as required by Section 2.125.3(i) of the Division’s **Procedures for Testing and Monitoring Sources of Air Pollutants** for the SO_2 CEMS required by Condition 5.2.1h, for Source 3 comprised of electric utility steam generating units with emission unit Nos. SG01, SG02, SG03, and SG04, for the combined inlet, located in the FGD inlet duct, at least 45 days before commencing certification testing of the monitoring system. The Permittee shall comply with the requirements in the plan. The plan must address the following information:
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

a. Installation of the CEMS sampling probe or other interface at a measurement location relative to each affected process unit such that the measurement is representative of the exhaust emissions (e.g., on or downstream of the last control device).

b. Performance and equipment specifications for the sample interface, the pollutant concentration or parametric signal analyzer, and the data collection and reduction systems.

c. Performance evaluation procedures and acceptance criteria. (e.g., calibrations, relative accuracy test audits (RATA), etc.).

d. Operation and maintenance procedures in accordance with the general requirements of 40 CFR Part 75 or other acceptable procedures approved by the Division.

e. Ongoing recordkeeping and reporting procedures.

5.2.14 The SO_2, CO_2, and/or O_2 CEMS required by Condition 5.2.1 shall be installed, certified, and operated in accordance with the applicable procedures in Performance Specification 2 or 3 in Appendix B of the Division's **Procedures for Testing and Monitoring Sources of Air Pollutants** or according to the procedures in Appendices A and B to 40 CFR Part 75. Daily calibration drift assessments and quarterly accuracy determinations shall be done in accordance with Procedure 1 in Appendix F of the Division's **Procedures for Testing and Monitoring Sources of Air Pollutants**. A data assessment report (DAR) shall be prepared according to Section 7 of Procedure 1 in Appendix F and shall be maintained on site and available for inspection or submittal to the Director. The Permittee may elect to implement alternative data accuracy procedures in Section 2.125.3(j) of the Division's **Procedures for Testing and Monitoring Sources of Air Pollutants**.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

5.2.15 Except for periods of startup, shutdown, or malfunction, for each day or portion of a day that coal is burned in Steam Generating Units 1, 2, 3, or 4, the Permittee shall determine the daily average sulfur content (%S) of coal burned. A daily average shall be defined as an average of the hourly data for each unit for the day or portion of the day that coal is burned. For purposes of this Permit, the Permittee shall use the following equation to compute the hourly sulfur content (%S).
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

$$\%S = \left(\frac{E_{SO2} * 0.5}{(Units\ 1-3\ CoalFlow * 0.95) + (Unit\ \ 4\ CoalFlow * 0.95 * (1-R))} \right) * 100$$

$$E_{SO2} = SO_2 (lb/MMBtu) * HeatInput(MMbtu/hr)$$

$$HeatInput(MMbtu/hr) = Q * \left(\frac{1}{Fc}\right) * \left(\frac{\%CO_2}{100}\right) \text{(Eq. F-15 from 40 CFR 75)}$$

Where:
%S = coal sulfur content, percent by weight;
E_{SO2} = hourly SO_2 emissions at the FGD inlet (or in the bypass stack, if applicable), lb/hr;
SO_2 (lb/MMBtu) = Output of the FGD Inlet CEMS required by Condition 5.2.1h. or the CEMS required by Conditions 5.2.1f. or 5.2.1g., as appropriate.
Q = Hourly average volumetric flow rate during unit operation, wet basis, scfh;
F_C = Carbon-based F-factor, listed in 40 CFR 75, App. F, Section 3.3.5 for each fuel, scf/MMBtu;
$\%CO_2$ = Hourly concentration of CO_2 during unit operation, percent CO_2 wet basis; outlet CEMS
0.5 = Ratio of sulfur and sulfur dioxide molecular weights, dimensionless;
Coal flow = Hourly coal flow rate, lb/hr;
0.95 = Factor to account for sulfur to SO_2 conversion, dimensionless (from Table 1.1-3 in AP-42); and

R = 0.01, Correction factor for conversion of SO_2 to SO_3 in SCR, dimensionless.

If one or more steam generating units is operating through the bypass stack, the following two equations should be used:

$$\%S = \left(\frac{E_{SO2} * 0.5}{(Units\ 1-3\ CoalFlow * 0.95)} \right) * 100$$

$$\%S = \left(\frac{E_{SO2} * 0.5}{(Unit\ 4\ CoalFlow * 0.95 * (1-R)} \right) * 100$$

As an alternative to this equation, for each day or portion of a day that coal is burned in Steam Generating Units 1, 2, 3, or 4, the Permittee may obtain a sample of as-bunkered coal for analysis for sulfur content (%S). The sample shall be acquired and analyzed using the procedures of Section 12.5.2.1 in Method 19 of the **Division's Procedures for Testing and Monitoring Sources of Air Pollutants**, or acquired using ASTM Method D2234 and/or D7430, prepared using ASTM Method D 2013, and analyzed using ASTM Method D 4239.

State Only Enforceable Condition

5.2.16 Except from May 1 through September 30, the Permittee shall monitor and record the flue gas flow through SCR4 while it is in operation. Flue gas flow through the SCR is defined as periods when the damper position is at least 90% open for more than 30 minutes per operating hour, excluding periods described in Georgia Rules for Air Quality Control 391-3-1-.02(2)(sss)17. From May 1 through September 30, the Permittee shall demonstrate compliance with the requirement in Georgia Rule 391-3-1.02(2)(sss) to operate steam generating unit SG04 only when equipped with selective catalytic reduction through compliance with Georgia Rule 391-3-1-.02(2)(jjj), except during the periods that the Permittee is not required to operate selective catalytic reduction, as described in Georgia Rules for Air Quality Control 391-3-1.02(2)(sss)17.
[391-3-1-.02(6)(b)1]

State Only Enforceable Condition

5.2.17 The Permittee shall demonstrate compliance with the requirement in Georgia Rule 391-3-1.02(2)(sss) to operate steam generating units SG01, SG02, SG03, and SG04 only when equipped with flue gas desulfurization through compliance with Georgia Rule 391-3-1-.02(2)(uuu), except during the periods that the Permittee is not required to operate flue gas desulfurization, as described in Georgia Rules for Air Quality Control 391-3-1.02(2)(sss)17.
[391-3-1-.02(6)(b)1]

PART 6.0 RECORD KEEPING AND REPORTING REQUIREMENTS

6.1 General Record Keeping and Reporting Requirements

6.1.1 Unless otherwise specified, all records required to be maintained by this Permit shall be recorded in a permanent form suitable for inspection and submission to the Division and to the EPA. The records shall be retained for at least five (5) years following the date of entry.
[391-3-1-.02(6)(b)1(i) and 40 CFR 70.6(a)(3)]

6.1.2 In addition to any other reporting requirements of this Permit, the Permittee shall report to the Division in writing, within seven (7) days, any deviations from applicable requirements associated with any malfunction or breakdown of process, fuel burning, or emissions control equipment for a period of four hours or more which results in excessive emissions.

The Permittee shall submit a written report that shall contain the probable cause of the deviation(s), duration of the deviation(s), and any corrective actions or preventive measures taken.
[391-3-1-.02(6)(b)1(iv), 391-3-1-.03(10)(d)1(i) and 40 CFR 70.6(a)(3)(iii)(B)]

6.1.3 The Permittee shall submit written reports of any failure to meet an applicable emission limitation or standard contained in this permit and/or any failure to comply with or complete a work practice standard or requirement contained in this permit which are not otherwise reported in accordance with Conditions 6.1.4 or 6.1.2. Such failures shall be determined through observation, data from any monitoring protocol, or by any other monitoring which is required by this permit. The reports shall cover each semiannual period ending June 30 and December 31 of each year, shall be postmarked by August 29 and February 28, respectively following each reporting period, and shall contain the probable cause of the failure(s), duration of the failure(s), and any corrective actions or preventive measures taken.
[391-3-1-.03(10)(d)1.(i) and 40 CFR 70.6(a)(3)(iii)(B)]

6.1.4 The Permittee shall submit a written report containing any excess emissions, exceedances, and/or excursions as described in this permit and any monitor malfunctions for each quarterly period ending March 31, June 30, September 30, and December 31 of each year. All reports shall be postmarked by May 30, August 29, November 29, and February 28, respectively following each reporting period. In the event that there have not been any excess emissions, exceedances, excursions or malfunctions during a reporting period, the report should so state. Otherwise, the contents of each report shall be as specified by the **Division's Procedures for Testing and Monitoring Sources of Air Pollutants** and shall contain the following:
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(iii)(A)]

a. A summary report of excess emissions, exceedances and excursions, and monitor downtime, in accordance with Section 1.5(c) and (d) of the above referenced document, including any failure to follow required work practice procedures.

b. Total process operating time during each reporting period.

c. The magnitude of all excess emissions, exceedances and excursions computed in accordance with the applicable definitions as determined by the Director, and any conversion factors used, and the date and time of the commencement and completion of each time period of occurrence.

d. Specific identification of each period of such excess emissions, exceedances, and excursions that occur during startups, shutdowns, or malfunctions of the affected facility. Include the nature and cause of any malfunction (if known), the corrective action taken or preventive measures adopted.

e. The date and time identifying each period during which any required monitoring system or device was inoperative (including periods of malfunction) except for zero and span checks, and the nature of the repairs, adjustments, or replacement. When the monitoring system or device has not been inoperative, repaired, or adjusted, such information shall be stated in the report.

f. Certification by a Responsible Official that, based on information and belief formed after reasonable inquiry, the statements and information in the report are true, accurate, and complete.

6.1.5 Where applicable, the Permittee shall keep the following records:
[391-3-1-.03(10)(d)1(i) and 40 CFR 70.6(a)(3)(ii)(A)]

a. The date, place, and time of sampling or measurement;

b. The date(s) analyses were performed;

c. The company or entity that performed the analyses;

d. The analytical techniques or methods used;

e. The results of such analyses; and

f. The operating conditions as existing at the time of sampling or measurement.

6.1.6 The Permittee shall maintain files of all required measurements, including continuous monitoring systems, monitoring devices, and performance testing measurements; all continuous monitoring system or monitoring device calibration checks; and adjustments and maintenance performed on these systems or devices. These files shall be kept in a permanent form suitable for inspection and shall be maintained for a period of at least five (5) years following the date of such measurements, reports, maintenance and records.
[391-3-1-.03(10)(d)1(i) and 40 CFR 70.6 (a)(3)(ii)(B)]

6.1.7 For the purpose of reporting excess emissions, exceedances or excursions in the report required in Condition 6.1.4, the following excess emissions, exceedances, and excursions shall be reported:
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

a. Excess emissions: (means for the purpose of this Condition and Condition 6.1.4, any condition that is detected by monitoring or record keeping which is specifically defined, or stated to be, excess emissions by an applicable requirement)

i. Excess emissions of nitrogen oxides as described in Condition 6.2.9.

b. Exceedances: (means for the purpose of this Condition and Condition 6.1.4, any condition that is detected by monitoring or record keeping that provides data in terms of an emission limitation or standard and that indicates that emissions (or opacity) do not meet the applicable emission limitation or standard consistent with the averaging period specified for averaging the results of the monitoring)

i. Any six-minute period during which the average opacity, as measured by the COMS for any steam generating source (Source 1 comprised of emission unit IDs SG01, SG02, and SG03, combined exhaust; Source 2 comprised of emission unit ID SG04), exceeds 40 percent.

ii. An ozone season (May 1 through September 30) total NOx emission rate which exceeds 32,335.8 tons from the applicable equipment specified in Condition 3.2.3.

iii. Any time fuel fired in any steam generating unit (emission unit IDs SG01, SG02, SG03, or SG04) has a sulfur content which exceeds 3.0 percent sulfur, by weight.

iv. Any 30 day rolling average SO_2 percent reduction that is calculated in accordance with the procedures of Condition 6.2.13 that is less than 95% for each of the steam generating units (Emission Unit IDs SG01, SG02, SG03 and SG04).

c. Excursions: (means for the purpose of this Condition and Condition 6.1.4, any departure from an indicator range or value established for monitoring consistent with any averaging period specified for averaging the results of the monitoring)

i. For Source 1, comprised of steam generating units 1, 2, and 3 (emission unit IDs SG01, SG02, SG03), any three-hour block average during which the arithmetic average opacity, as measured by the COMS, exceeds 40 percent. A three-hour block average shall be defined as any one of the eight consecutive three-hour time periods between 12:00 midnight and the following midnight.

ii. For Source 2, comprised of steam generating unit 4 (emission unit ID SG04), any three-hour block average during which the arithmetic average opacity, as measured by the COMS, exceeds 37 percent. A three-hour block average shall be defined as any one of the eight consecutive three-hour time periods between 12:00 midnight and the following midnight

iii. Any time coal derived synthetic fuel fired in any steam generating unit (emission unit IDs SG01, SG02, SG03, or SG04) does not meet the specification of Condition 3.2.1.e.

iv. For Source 3, comprised of steam generating units 1, 2, 3 and 4 (emission unit IDs SG01, SG02, SG03 and SG04), any three-hour block average less than 15 KW for EP01, EP02 or EP03 or 30 KW for EP04 and less than six FGD1 recycle pumps running. A three-hour block average shall be defined as any one of the eight consecutive three-hour time periods between 12:00 midnight and the following midnight.

State Only Enforceable Condition

v. Except from May 1 through September 30, any 30 consecutive operating day period in which the flue gas did not go through the SCR for at least 90% of the operating hours during that period, excluding periods described in Georgia Rules for Air Quality Control 391-3-1-.02(2)(sss)17.

6.2 Specific Record Keeping and Reporting Requirements

State Only Enforceable Condition

6.2.1 The Permittee shall retain monthly records of all fuel burned (except c, d and f, below, which shall be monitored on an as received basis), in the Plant Hammond steam generating units (emission unit IDs SG01, SG02, SG03, and SG04). The records shall be available for inspection or submittal to the Division, upon request, and contain the following:
[391-3-1-.02(6)(b)1(i)]

a. Quantity (tons) of coal burned.

b. Aggregate total quantity (gallons) of biodiesel, biodiesel blends, distillate oil, No. 2 fuel oil, or very low sulfur oil burned.

c. Quantity (tons) of sawdust received.

d. Quantity (tons) of biomass received.

e. Quantity (gallons) of used oil burned.

f. Quantity (tons) of coal-derived synthetic fuel received.

State Only Enforceable Condition.

6.2.2 The Permittee shall maintain records of representative samples of the coal and sawdust burned in the steam generating units (emission unit IDs SG01, SG02, SG03, and SG04) for five years after the date and year of record. The records shall be available for inspection or submittal to the Division, upon request, and contain the following:
[391-3-1-.02(6)(b)1(i)]

a. Percent ash content of coal.

b. Heat content (Btu per pound) of sawdust.

6.2.3 For each shipment of No. 2 fuel oil received, the Permittee shall obtain from the supplier of the fuel oil, a statement certifying that the oil complies with the specifications of No. 2 fuel oil contained in ASTM D396 or ASTM D975. As an alternative to the procedure described above, the Permittee may, for each shipment of No. 2 fuel oil received, obtain a sample for analysis of the sulfur content. The procedures of ASTM D4057 shall be used to acquire the sample. Sulfur content shall be determined using the procedures of Test Method ASTM D129, D1552 or by some other test method approved by the US EPA and acceptable to the Division.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

6.2.4 The Permittee shall obtain from the supplier a statement certifying that each shipment of coal derived synthetic fuel to be received complies with the specifications as described in Condition 3.2.1(e).
[391-3-1-.02(6)(b)1.(i)]

6.2.5 The Permittee shall maintain a record of all actions taken in accordance with Condition 3.4.4 to suppress fugitive dust from the coal handling system (CHS), the ash handling system (Emission Unit ID AHS), and the materials handling system (Emission Unit ID MHS). Such records shall include the date and time of occurrence and a description of the actions taken.
[391-3-1-.02(6)(b)1(i) and 40 CFR 70.6(a)(3)(i)]

Record Keeping Requirements for the Ozone Season NOx Emission Caps

6.2.6 The Permittee shall use the data obtained from the NOx CEMS to compute the monthly mass emission rate, in tons per calendar month, of NOx from the following coal-fired steam generating units on a combined basis: emission unit IDs SG01, SG02, SG03, and SG04 at Plant Bowen (AFS No. 015-00011); emission unit IDs SG01, SG02, SG03, and SG04 at Plant Branch (AFS No. 237-00008); emission unit IDS SG01, SG02, SG03, and SG04 at Plant Hammond (AFS No. 115-00003); emission unit IDS SGM1 and SGM2 at Plant McDonough (AFS No. 067-00003); emission unit IDs SG01, SG02, SG03, SG04 at Plant Scherer (AFS No. 207-00008); emission unit IDS SG01 and SG02 at Plant Wansley (AFS No. 149-00001); emission unit IDs SG01, SG02, SG03, SG04, SG05, SG06, and SG07 at Plant Yates (AFS No. 077-00001). This emission rate must include emissions from startup, shutdown, and malfunction. This condition only applies during the ozone season (May 1 to September 30).
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

6.2.7 The Permittee shall use the records required by Condition 6.2.6 to determine the ozone season total emission rate, in tons, of NOx from the following coal-fired steam generating units on a combined basis: emission unit IDs SG01, SG02, SG03, and SG04 at Plant Bowen (AFS No. 015-00011); emission unit IDs SG01, SG02, SG03, and SG04 at Plant Branch (AFS No. 237-00008); emission unit IDS SG01, SG02, SG03, and SG04 at Plant Hammond (AFS No. 115-00003); emission unit IDS SGM1 and SGM2 at Plant McDonough (AFS No. 067-00003); emission unit IDs SG01, SG02, SG03, SG04 at Plant

Scherer (AFS No. 207-00008); emission unit IDS SG01 and SG02 at Plant Wansley (AFS No. 149-00001); emission unit IDs SG01, SG02, SG03, SG04, SG05, SG06, and SG07 at Plant Yates (AFS No. 077-00001). This emission rate must include emissions from startup, shutdown, and malfunction.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

Record Keeping for the Verification of Georgia Rule (jjj) NOx Emission Limits

6.2.8 The Permittee shall determine compliance with the NOx emissions limitations in Condition Nos. 3.4.6 through 3.4.8 using emissions data acquired by the NOx CEMS. The 30-day rolling average shall be determined as follows:
[391-3-1-.02(6)(b)1(i) and 40 CFR 70.6(a)(3)(i)]

a. The first 30-day averaging period shall begin on the first operating day of the ozone season.

b. The 30-day average shall be the average of all valid hours of NOx emissions data for any 30 successive operating days during the period of the ozone season.

c. The last 30-day averaging period shall end on the last operating day of the ozone season.

d. After the first 30-day average, a new 30-day rolling average shall be calculated after each operating day.

e. For the purpose of this Permit, an operating day is a 24 hour period between 12:00 midnight and the following midnight during which any fuel is combusted at any time. It is not necessary for the fuel to be combusted continuously for the entire 24-hour period.

6.2.9 The Permittee shall determine compliance with the limitation using the procedures of Section 2.116.2 of the Division's **Procedures for Testing and Monitoring Sources of Air Pollutants**. The Permittee shall maintain the records specified in Section 2.116.4 of the aforementioned procedures document and use these records to prepare a quarterly report. Reportable emissions are any calculated 30-day rolling average NOx emissions rate which exceeds the limit established in Condition No. 3.4.6. Excess emissions are those that exceed an area-wide average limit in Condition Nos. 3.4.7 or 3.4.8 as well as the source's respective Alternative Emission Limitation as specified in Condition No. 3.4.6.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

Reporting Requirements

6.2.10 The Permittee may submit, via electronic media, any report required by Part 6.0 of this permit provided such format has been approved by the Division.

6.2.11 The Permittee shall submit written reports to the Division of reportable emissions under Condition 6.2.9 (excess emissions would be reported per Condition 6.1.7) for each calendar quarter ending June 30 (April excluded) and September 30. All reports shall be postmarked by the August 29th and November 29th, respectively following each reporting period. In the

event that there have not been any reportable emissions during a reporting period, the report should state as such.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

6.2.12 For each shipment of biodiesel or biodiesel blend received, the Permittee shall obtain from the supplier of the biodiesel or biodiesel blend, a statement certifying that the biodiesel complies with the specifications of biodiesel contained in ASTM D6751. As an alternative to the procedure described above, the Permittee may, for each shipment of biodiesel or biodiesel blend obtain a sample for analysis of the sulfur content. The procedures of ASTM D4057 shall be used to acquire the sample. Sulfur content shall be determined using the procedures of Test Method ASTM D129 or ASTM D1552 or by some other test method approved by the US EPA and acceptable to the Division.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

6.2.13 The Permittee shall determine compliance with the SO_2 emissions limitations in Condition No. 3.4.9 based on the average emission rate for 30 successive boiler operating days.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

a. The percent of potential SO_2 emissions ($\%P_s$) to the atmosphere shall be computed using the following equation:

$$\%P_s = \frac{(100 - \%R_f)(100 - \%R_g)}{100}$$

Where:

$\%P_s$ = Percent of potential SO_2 emissions, percent;

$\%R_f$ = Percent reduction from fuel pretreatment, percent; and

$\%R_g$ = Percent reduction by SO_2 control system, percent.

b. The procedures of Method 19 may be used to determine percent reduction ($\%R_f$) of sulfur by such processes as fuel pretreatment (physical coal cleaning, hydrodesulfurization of fuel oil, etc.), coal pulverizers, and bottom and fly ash interactions. This determination is optional.

c. The procedures in Method 19 shall be used to determine the percent SO_2 reduction (%Rg) of any SO_2 control system. Alternatively, a combination of an “as fired” fuel monitor and emission rates measured after the control system, following the procedures in Method 19, may be used if the percent reduction is calculated using the average emission rate from the SO_2 control device and the average SO_2 input rate from the “as fired” fuel analysis for 30 successive boiler operating days.

6.2.14 The Permittee shall determine compliance with the limitation in Condition No. 3.4.9 using the procedures of Section 2.125.4 of the Division’s **Procedures for Testing and Monitoring Sources of Air Pollutants**. The Permittee shall maintain the records specified in Section 2.125.5 of the aforementioned document and the records used to prepare a

quarterly report. Reportable emissions are any calculated 30-day rolling average SO_2 emissions reduction which exceed the limit established in Condition No. 3.4.9. The following information shall be maintained for each 24-hour reporting period:
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

a. Calendar date.

b. Percent reduction of the potential combustion concentration of SO_2 for each 30 successive boiler operating days; reasons for non-compliance with the emissions standards; and description of corrective actions taken.

c. Identification of the boiler operating days for which pollutant or diluent data have not been obtained by an approved method for at least 75 percent of the hours of operation of the facility; justification for not obtaining sufficient data; and description of corrective actions taken.

d. Identification of the times when emissions data have been excluded from the calculation of average emission rates because of startup, shutdown, or other reasons, and justification for excluding data for reasons other than startup or shutdown conditions.

e. Identification of "F" factor used for calculations, method of determination, and type of fuel combusted.

f. Identification of times when hourly averages have been obtained based on manual sampling methods.

g. Identification of the times when the pollutant concentration exceeded full span of the CEMS.

h. Description of any modifications to CEMS which could affect the ability of the CEMS to comply with Performance Specifications 2 or 3.

i. Results of any daily calibration error tests or quarterly accuracy assessment as required under Section 2.125.3(j) of the aforementioned document that does not meet the applicable accuracy specification and the subsequent acceptable daily calibration error test or quarterly accuracy assessment.

6.2.15 The Permittee shall submit written reports to the Division of reportable emissions under Condition 6.2.14 (excess emissions would be reported per Condition 6.1.7) for each calendar quarter. All reports shall be postmarked by May 30th, August 29th, November 29th, and February 28th, respectively following the end of each reporting period. In the event that there have not been any reportable emissions during a reporting period, the report should state as such. The Permittee shall determine compliance with the limitation using the procedures of Section 2.125.4 of the Division's **Procedures for Testing and Monitoring Sources of Air Pollutants**. The Permittee shall maintain the records specified in Section 2.125.5 of the aforementioned procedures document and use these records to prepare a

quarterly report. Reportable emissions are any calculated 30-day rolling average SO_2 emissions rate which exceeds the limit established in Condition No. 3.4.7.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

6.2.16 In the event the minimum quantity of emissions data as required by Section 2.125.4 of the Division's **Procedures for Testing and Monitoring Sources of Air Pollutants** is not obtained for any 30 successive boiler operating days, the following information obtained under the requirements of Section 2.125.2(d) of the aforementioned document is reported to the Division for that 30-day period.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

a. The number of hourly averages available for outlet emission rates (n_o) and inlet emission rates (n_i), as applicable.

b. The standard deviation of hourly averages for outlet emission rates (s_o) and inlet emission rates (s_i), as applicable.

c. The lower confidence limit for the mean outlet emission rate (E_o*) and the upper confidence limit for the mean inlet emission rate (E_i*), as applicable.

d. The applicable potential combustion concentration.

e. The ratio of the upper confidence limit for the mean outlet emission rate (E_o*) and the allowable emission rate (E_{std}), as applicable.

6.2.17 For any periods for which SO_2 emissions data are not available, the Permittee shall submit a signed statement to the Division indicating if any changes were made in operation of the emission control system during the period of data unavailability. Operations of the control system and affected facility during periods of data unavailability are to be compared with operation of the control system and affected facility before and following the period of data unavailability. Within the signed statement, the Permittee must include:
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

a. Verification of whether the required CEMS calibration, span, and drift checks or other periodic audits have or have not been performed as specified.

b. The data used to show compliance was or was not obtained in accordance with approved methods and procedures of this text and is representative of plant performance.

c. The minimum data requirements have or have not been met; or, the minimum data requirements have not been met for errors that were unavoidable.

d. Compliance with the standards has or has not been achieved during the reporting period.

6.2.18 The Permittee shall submit results of each RATA required under Section 2.125.3(j) of the Division's **Procedures of Monitoring and Testing of Air Pollutants** within 60 days of the completion of RATA.

PART 7.0 OTHER SPECIFIC REQUIREMENTS

7.1 Operational Flexibility

7.1.1 The Permittee may make Section 502(b)(10) changes as defined in 40 CFR 70.2 without requiring a Permit revision, if the changes are not modifications under any provisions of Title I of the Federal Act and the changes do not exceed the emissions allowable under the Permit (whether expressed therein as a rate of emissions or in terms of total emissions). For each such change, the Permittee shall provide the Division and the EPA with written notification as required below in advance of the proposed changes and shall obtain any Permits required under Rules 391-3-1-.03(1) and (2). The Permittee and the Division shall attach each such notice to their copy of this Permit.
[391-3-1-.03(10)(b)5 and 40 CFR 70.4(b)(12)(i)]

a. For each such change, the Permittee's written notification and application for a construction Permit shall be submitted well in advance of any critical date (typically at least 3 months in advance of any commencement of construction, Permit issuance date, etc.) involved in the change, but no less than seven (7) days in advance of such change and shall include a brief description of the change within the Permitted facility, the date on which the change is proposed to occur, any change in emissions, and any Permit term or condition that is no longer applicable as a result of the change.

b. The Permit shield described in Condition 8.16.1 shall not apply to any change made pursuant to this condition.

7.2 Off-Permit Changes

7.2.1 The Permittee may make changes that are not addressed or prohibited by this Permit, other than those described in Condition 7.2.2 below, without a Permit revision, provided the following requirements are met:
[391-3-1-.03(10)(b)6 and 40 CFR 70.4(b)(14)]

a. Each such change shall meet all applicable requirements and shall not violate any existing Permit term or condition.

b. The Permittee must provide contemporaneous written notice to the Division and to the EPA of each such change, except for changes that qualify as insignificant under Rule 391-3-1-.03(10)(g). Such written notice shall describe each such change, including the date, any change in emissions, pollutants emitted, and any applicable requirement that would apply as a result of the change.

c. The change shall not qualify for the Permit shield in Condition 8.16.1.

d. The Permittee shall keep a record describing changes made at the source that result in emissions of a regulated air pollutant subject to an applicable requirement, but not otherwise regulated under the Permit, and the emissions resulting from those changes.

7.2.2 The Permittee shall not make, without a Permit revision, any changes that are not addressed or prohibited by this Permit, if such changes are subject to any requirements under Title IV of the Federal Act or are modifications under any provision of Title I of the Federal Act. [Rule 391-3-1-.03(10)(b)7 and 40 CFR 70.4(b)(15)]

7.3 Alternative Requirements
[391-3-1-.03(10)(d)8 and White Paper #2]

Not Applicable.

7.4 Insignificant Activities
(see Attachment B for the list of Insignificant Activities in existence at the facility at the time of permit issuance)

7.5 Temporary Sources
[391-3-1-.03(10)(d)5 and 40 CFR 70.6(e)]

Not Applicable.

7.6 Short-term Activities

7.6.1 The Permittee shall maintain records of the duration and frequency of the following Short-term Activities:

a. Sand blasting for maintenance purposes in accordance with Georgia Rule 391-3-1-.02(2)(n).

b. Asbestos removal in accordance with Georgia Rule 391-3-1-.02(9)(b)7.

7.7 Compliance Schedule/Progress Reports
[391-3-1-.03(10)(d)3 and 40 CFR 70.6(c)(4)]

None applicable.

7.8 Emissions Trading
[391-3-1-.03(10)(d)1(ii) and 40 CFR 70.6(a)(10)]

Not Applicable.

7.9 Acid Rain Requirements

Facility ORIS code: 0708
Effective: January 1, 2011 through December 31, 2015

7.9.1 Emissions which exceed any allowances that the permittee lawfully holds under Title IV of the 1990 CAAA, or the regulations promulgated thereunder, are expressly prohibited. [40 CFR 70.6(a)(4)]

7.9.2 Permit revisions are not required for increases in emissions that are authorized by allowances acquired pursuant to the State's Acid Rain Program, provided that such increases do not require a permit revision under any other applicable requirement.
[40 CFR 70.6(a)(4)(i)]

7.9.3 This permit does not place limits on the number of allowances the permittee may hold. However, the permittee may not use allowances as a defense to noncompliance with any other applicable requirement.
[40 CFR 70.6(a)(4)(ii)]

7.9.4 Any allowances held by the permittee shall be accounted for according to the procedures established in regulations promulgated under Title IV of the 1990 CAAA.
[40 CFR 70.6(a)(4)(iii)]

7.9.5 Each affected unit, with the exceptions specified in 40 CFR 72.9(g)(6), operated in accordance with the Acid Rain portion of this permit shall be deemed to be operating in compliance with the Acid Rain Program.
[40 CFR 70.6(f)(3)(iii)]

7.9.6 Where an applicable requirement is more stringent than an applicable requirement of regulations promulgated under Title IV of the 1990 CAAA, both provisions shall be incorporated into the permit and shall be enforceable.
[40 CFR 70.6(a)(1)(ii)]

7.9.7 SO_2 Allowance Allocations and NOx Requirements for each affected unit [40 CFR 73 (SO_2) and 40 CFR 76 (NOx)]

EMISSION UNIT ID	EPA ID		2011	2012	2013	2014	2015
SG01	1	SO_2 Allowances	3793	3793	3793	3793	3793
		NO_X Limit	The standard annual average NOx limit for a Phase I dry bottom wall-fired boiler is 0.50 lb/mmBtu. In lieu of this limit, the Permittee may comply with 40 CFR Part 76 by complying with an approved Phase II NOx averaging plan as described below.				

Pursuant to 40 CFR 76.11, Georgia EPD approves five NOx emissions averaging plans for this unit. Each plan is effective for one calendar year for the years 2011, 2012, 2013, 2014, and 2015. Under each plan, this unit's NOx emissions shall not exceed the annual average alternative contemporaneous emission limitation of **0.83 lb/mmBtu**. In addition, this unit shall not have an annual heat input less than **6,702,621 mmBtu**.

Under the plan, the actual Btu-weighted annual average NOx emission rate for the units in the plan shall be less than or equal to the Btu-weighted annual average NOx emission rate for the same units had they each been operated, during the same period of time, in compliance with the applicable emission limitations under 40 CFR 76.5, 76.6, or 76.7, except that for any early election units, the applicable emission limitations shall be under 40 CFR 76.7. If the designated representative demonstrates that the requirement of the prior sentence (as set forth in 40 CFR 76.11(d)(1)(ii)(A)) is met for a year under the plan, then this unit shall be deemed to be in compliance for that year with its alternative contemporaneous annual emission limitation and annual heat input limit.

In accordance with 40 CFR 72.40(b)(2), approval of the averaging plan shall be final only when the Mississippi Department of Environmental Quality, the Alabama Department of Environmental Management, the Florida Department of Environmental Protection, and the Jefferson County Department of Health (Alabama) have also approved this averaging plan.

In addition to the described NOx compliance plan, this unit shall comply with all other applicable requirements of 40 CFR part 76, including the duty to reapply for a NOx compliance plan and requirements covering excess emissions.

EMISSION UNIT ID	EPA ID		2011	2012	2013	2014	2015
SG02	2	SO_2 Allowances	3981	3981	3981	3981	3981
		NO_X Limit	The standard annual average NOx limit for a Phase I dry bottom wall-fired boiler is 0.50 lb/mmBtu. In lieu of this limit, the Permittee may comply with 40 CFR Part 76 by complying with an approved Phase II NOx averaging plan as described below.				

Pursuant to 40 CFR 76.11, Georgia EPD approves five NOx emissions averaging plans for this unit. Each plan is effective for one calendar year for the years 2011, 2012, 2013, 2014, and 2015. Under each plan, this unit's NOx emissions shall not exceed the annual average alternative contemporaneous emission limitation of **0.83 lb/mmBtu**. In addition, this unit shall not have an annual heat input less than **7,697,469 mmBtu**.

Under the plan, the actual Btu-weighted annual average NOx emission rate for the units in the plan shall be less than or equal to the Btu-weighted annual average NOx emission rate for the same units had they each been operated, during the same period of time, in compliance with the applicable emission limitations under 40 CFR 76.5, 76.6, or 76.7, except that for any early election units, the applicable emission limitations shall be under 40 CFR 76.7. If the designated representative demonstrates that the requirement of the prior sentence (as set forth in 40 CFR 76.11(d)(1)(ii)(A)) is met for a year under the plan, then this unit shall be deemed to be in compliance for that year with its alternative contemporaneous annual emission limitation and annual heat input limit.

In accordance with 40 CFR 72.40(b)(2), approval of the averaging plan shall be final only when the Mississippi Department of Environmental Quality, the Alabama Department of Environmental Management, the Florida Department of Environmental Protection, and the Jefferson County Department of Health (Alabama) have also approved this averaging plan.

In addition to the described NOx compliance plan, this unit shall comply with all other applicable requirements of 40 CFR part 76, including the duty to reapply for a NOx compliance plan and requirements covering excess emissions.

EMISSION UNIT ID	EPA ID		2011	2012	2013	2014	2015
SG03	3	SO_2 Allowances	3850	3850	3850	3850	3850
		NO_X Limit	The standard annual average NOx limit for a Phase I dry bottom wall-fired boiler is 0.50 lb/mmBtu. In lieu of this limit, the Permittee may comply with 40 CFR Part 76 by complying with an approved Phase II NOx averaging plan as described below.				

Pursuant to 40 CFR 76.11, Georgia EPD approves five NOx emissions averaging plans for this unit. Each plan is effective for one calendar year for the years 2011, 2012, 2013, 2014, and 2015. Under each plan, this unit's NOx emissions shall not exceed the annual average alternative contemporaneous emission limitation of **0.83 lb/mmBtu**. In addition, this unit shall not have an annual heat input less than **6,610,570 mmBtu**.

Under the plan, the actual Btu-weighted annual average NOx emission rate for the units in the plan shall be less than or equal to the Btu-weighted annual average NOx emission rate for the same units had they each been operated, during the same period of time, in compliance with the applicable emission limitations under 40 CFR 76.5, 76.6, or 76.7, except that for any early election units, the applicable emission limitations shall be under 40 CFR 76.7. If the designated representative demonstrates that the requirement of the prior sentence (as set forth in 40 CFR 76.11(d)(1)(ii)(A)) is met for a year under the plan, then this unit shall be deemed to be in compliance for that year with its alternative contemporaneous annual emission limitation and annual heat input limit.

In accordance with 40 CFR 72.40(b)(2), approval of the averaging plan shall be final only when the Mississippi Department of Environmental Quality, the Alabama Department of Environmental Management, the Florida Department of Environmental Protection, and the Jefferson County Department of Health (Alabama) have also approved this averaging plan.

In addition to the described NOx compliance plan, this unit shall comply with all other applicable requirements of 40 CFR part 76, including the duty to reapply for a NOx compliance plan and requirements covering excess emissions.

EMISSION UNIT ID	EPA ID		2011	2012	2013	2014	2015
SG04	4	SO_2 Allowances	16260	16260	16260	16260	16260
		NO_X Limit	The standard annual average NOx limit for a Phase I dry bottom wall-fired boiler is 0.50 lb/mmBtu. In lieu of this limit, the Permittee may comply with 40 CFR Part 76 by complying with an approved Phase II NOx averaging plan as described below.				

Pursuant to 40 CFR 76.11, Georgia EPD approves five NOx emissions averaging plans for this unit. Each plan is effective for one calendar year for the years 2011, 2012, 2013, 2014, and 2015. Under each plan, this unit's NOx emissions shall not exceed the annual average alternative contemporaneous emission limitation of **0.45 lb/mmBtu**. In addition, this unit shall not have an annual heat input less than **29,007,730 mmBtu**.

Under the plan, the actual Btu-weighted annual average NOx emission rate for the units in the plan shall be less than or equal to the Btu-weighted annual average NOx emission rate for the same units had they each been operated, during the same period of time, in compliance with the applicable emission limitations under 40 CFR 76.5, 76.6, or 76.7, except that for any early election units, the applicable emission limitations shall be under 40 CFR 76.7. If the designated representative demonstrates that the requirement of the prior sentence (as set forth in 40 CFR 76.11(d)(1)(ii)(A)) is met for a year under the plan, then this unit shall be deemed to be in compliance for that year with its alternative contemporaneous annual emission limitation and annual heat input limit.

In accordance with 40 CFR 72.40(b)(2), approval of the averaging plan shall be final only when the Mississippi Department of Environmental Quality, the Alabama Department of Environmental Management, the Florida Department of Environmental Protection, and the Jefferson County Department of Health (Alabama) have also approved this averaging plan.

In addition to the described NOx compliance plan, this unit shall comply with all other applicable requirements of 40 CFR part 76, including the duty to reapply for a NOx compliance plan and requirements covering excess emissions.

Note: The number of allowances allocated to Phase II affected units by U.S. EPA may change as a result of revisions to 40 CFR Part 73. In addition, the number of allowances actually held by an affected source in a unit account may differ from the number allocated by U.S. EPA. Neither of the aforementioned conditions necessitate a revision to the unit SO2 allowance allocations identified in this permit (See CFR 72.84).

7.10 Prevention of Accidental Releases (Section 112(r) of the 1990 CAAA)
[391-3-1-.02(10)]

7.10.1 When and if the requirements of 40 CFR Part 68 become applicable, the Permittee shall comply with all applicable requirements of 40 CFR Part 68, including the following.

a. The Permittee shall submit a Risk Management Plan (RMP) as provided in 40 CFR 68.150 through 68.185. The RMP shall include a registration that reflects all covered processes.

b. For processes eligible for Program 1, as provided in 40 CFR 68.10, the Permittee shall comply with 7.10.1.a. and the following additional requirements:

i. Analyze the worst-case release scenario for the process(es), as provided in 40 CFR 68.25; document that the nearest public receptor is beyond the distance to a toxic or flammable endpoint defined in 40 CFR 68.22(a); and submit in the RMP the worst-case release scenario as provided in 40 CFR 68.165.
ii. Complete the five-year accident history for the process as provided in 40 CFR 68.42 and submit in the RMP as provided in 40 CFR 68.168
iii. Ensure that response actions have been coordinated with local emergency planning and response agencies
iv. Include a certification in the RMP as specified in 40 CFR 68.12(b)(4)

c. For processes subject to Program 2, as provided in 40 CFR 68.10, the Permittee shall comply with 7.10.1.a., 7.10.1.b. and the following additional requirements:

i. Develop and implement a management system as provided in 40 CFR 68.15
ii. Conduct a hazard assessment as provided in 40 CFR 68.20 through 68.42
iii. Implement the Program 2 prevention steps provided in 40 CFR 68.48 through 68.60 or implement the Program 3 prevention steps provided in 40 CFR 68.65 through 68.87
iv. Develop and implement an emergency response program as provided in 40 CFR 68.90 through 68.95
v. Submit as part of the RMP the data on prevention program elements for Program 2 processes as provided in 40 CFR 68.170

d. For processes subject to Program 3, as provided in 40 CFR 68.10, the Permittee shall comply with 7.10.1.a., 7.10.1.b. and the following additional requirements:

i. Develop and implement a management system as provided in 40 CFR 68.15
ii. Conduct a hazard assessment as provided in 40 CFR 68.20 through 68.42
iii. Implement the prevention requirements of 40 CFR 68.65 through 68.87
iv. Develop and implement an emergency response program as provided in 40 CFR 68.90 through 68.95
v. Submit as part of the RMP the data on prevention program elements for Program 3 as provided in 40 CFR 68.175

e. All reports and notification required by 40 CFR Part 68 must be submitted electronically using RMP*eSubmit (information for establishing an account can be found at www.epa.gov/emergencies/content/rmp/rmp_esubmit.htm). Electronic Signature Agreements should be mailed to:

MAIL

Risk Management Program (RMP) Reporting Center
P.O. Box 10162
Fairfax, VA 22038

COURIER & FEDEX

Risk Management Program (RMP) Reporting Center
CGI Federal
12601 Fair Lakes Circle
Fairfax, VA 22033

Compliance with all requirements of this condition, including the registration and submission of the RMP, shall be included as part of the compliance certification submitted in accordance with Condition 8.14.1.

7.11 Stratospheric Ozone Protection Requirements (Title VI of the CAAA of 1990)

7.11.1 If the Permittee performs any of the activities described below or as otherwise defined in 40 CFR Part 82, the Permittee shall comply with the standards for recycling and emissions reduction pursuant to 40 CFR Part 82, Subpart F, except as provided for motor vehicle air conditioners (MVACs) in Subpart B:

a. Persons opening appliances for maintenance, service, repair, or disposal must comply with the required practices pursuant to 40 CFR 82.156.

b. Equipment used during the maintenance, service, repair, or disposal of appliance must comply with the standards for recycling and recovery equipment pursuant to 40 CFR 82.158.

c. Persons performing maintenance, service, repair, or disposal of appliances must be certified by an approved technician certification program pursuant to 40 CFR 82.161.

d. Persons disposing of small appliances, MVACs, and MVAC-like appliances must comply with record keeping requirements pursuant to 40 CFR 82.166.
[Note: “MVAC-like appliance” is defined in 40 CFR 82.152.]

e. Persons owning commercial or industrial process refrigeration equipment must comply with the leak repair requirements pursuant to 40 CFR 82.156.

f. Owners/operators of appliances normally containing 50 or more pounds of refrigerant must keep records of refrigerant purchased and added to such appliances pursuant to 40 CFR 82.166.

7.11.2 If the Permittee performs a service on motor (fleet) vehicles and if this service involves an ozone-depleting substance (refrigerant) in the MVAC, the Permittee is subject to all the applicable requirements as specified in 40 CFR Part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners.

The term "motor vehicle" as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed. The term "MVAC" as used in Subpart B does not include air-tight sealed refrigeration systems used for refrigerated cargo, or air conditioning systems on passenger buses using HCFC-22 refrigerant.

7.12 Revocation of Existing Permits and Amendments

The following Air Quality Permits, Amendments, and 502(b)10 are subsumed by this permit and are hereby revoked:

Air Quality Permit and Amendment Number(s)	Dates of Original Permit or Amendment Issuance
4911-115-0003-V-02-0	November 15, 2005
4911-115-0003-V-02-1	Revoked
4911-115-0003-V-02-2	December 20, 2006
4911-115-0003-V-02-3	March 7, 2007
4911-115-0003-V-02-4	June 10, 2008
4911-115-0003-V-02-5	September 17, 2008
4911-115-0003-V-02-6	March 12, 2009
4911-115-0003-V-02-7	March 12, 2009
4911-115-0003-V-02-8	May 5, 2009
4911-115-0003-V-02-9	November 16, 2009
4911-115-0003-V-02-A	May 27, 2010
4911-115-0003-V-02-B	January 25, 2011

7.13 Pollution Prevention

None applicable.

7.14 Specific Conditions

None applicable.

7.15 Clean Air Interstate Rule (CAIR) Requirements

[40 CFR 96, 391-3-1-.02(12), 391-3-1-.02(13)]

7.15.1 Permit Application: The CAIR Permit Application, as corrected by the State of Georgia, is attached as part of this Permit. The owners and operators of these CAIR units as identified in Condition 7.15.2 must comply with the standard requirements and special provisions set forth in the application.
[40 CFR 96.121, 96.122, 96.221, 96.222, 96.321, and 96.322]

7.15.2 The owners and operators of the source shall comply with the Annual NO_X Allowance Allocations in accordance with the CAIR requirements as follows:
[40 CFR 96, 391-3-1-.02(12)]

	Emission Unit IDs.	EPA IDs.		2012	2013
Facility Wide	SG01 SG02 SG03 SG04	1 2 3 4	CAIR Facility Wide Annual NO_X Allowances (tpy)	3244	3244

PART 8.0 GENERAL PROVISIONS

8.1 Terms and References

8.1.1 Terms not otherwise defined in the Permit shall have the meaning assigned to such terms in the referenced regulation.

8.1.2 Where more than one condition in this Permit applies to an emission unit and/or the entire facility, each condition shall apply and the most stringent condition shall take precedence.
[391-3-1-.02(2)(a)2]

8.2 EPA Authorities

8.2.1 Except as identified as "State-only enforceable" requirements in this Permit, all terms and conditions contained herein shall be enforceable by the EPA and citizens under the Clean Air Act, as amended, 42 U.S.C. 7401, et seq.
[40 CFR 70.6(b)(1)]

8.2.2 Nothing in this Permit shall alter or affect the authority of the EPA to obtain information pursuant to 42 U.S.C. 7414, "Inspections, Monitoring, and Entry."
[40 CFR 70.6(f)(3)(iv)]

8.2.3 Nothing in this Permit shall alter or affect the authority of the EPA to impose emergency orders pursuant to 42 U.S.C. 7603, "Emergency Powers."
[40 CFR 70.6(f)(3)(i)]

8.3 Duty to Comply

8.3.1 The Permittee shall comply with all conditions of this operating Permit. Any Permit noncompliance constitutes a violation of the Federal Clean Air Act and the Georgia Air Quality Act and/or State rules and is grounds for enforcement action; for Permit termination, revocation and reissuance, or modification; or for denial of a Permit renewal application. Any noncompliance with a Permit condition specifically designated as enforceable only by the State constitutes a violation of the Georgia Air Quality Act and/or State rules only and is grounds for enforcement action; for Permit termination, revocation and reissuance, or modification; or for denial of a Permit renewal application.
[391-3-1-.03(10)(d)1(i) and 40 CFR 70.6(a)(6)(i)]

8.3.2 The Permittee shall not use as a defense in an enforcement action the contention that it would have been necessary to halt or reduce the Permitted activity in order to maintain compliance with the conditions of this Permit.
[391-3-1-.03(10)(d)1(i) and 40 CFR 70.6(a)(6)(ii)]

8.3.3 Nothing in this Permit shall alter or affect the liability of the Permittee for any violation of applicable requirements prior to or at the time of Permit issuance.
[391-3-1-.03(10)(d)1(i) and 40 CFR 70.6(f)(3)(ii)]

8.3.4 Issuance of this Permit does not relieve the Permittee from the responsibility of obtaining any other permits, licenses, or approvals required by the Director or any other federal, state, or local agency.
[391-3-1-.03(10)(e)1(iv) and 40 CFR 70.7(a)(6)]

8.4 Fee Assessment and Payment

8.4.1 The Permittee shall calculate and pay an annual Permit fee to the Division. The amount of fee shall be determined each year in accordance with the "Procedures for Calculating Air Permit Fees."
[391-3-1-.03(9)]

8.5 Permit Renewal and Expiration

8.5.1 This Permit shall remain in effect for five (5) years from the effective date. The Permit shall become null and void after the expiration date unless a timely and complete renewal application has been submitted to the Division at least six (6) months, but no more than eighteen (18) months prior to the expiration date of the Permit.
[391-3-1-.03(10)(d)1(i), (e)2, and (e)3(ii) and 40 CFR 70.5(a)(1)(iii)]

8.5.2 Permits being renewed are subject to the same procedural requirements, including those for public participation and affected State and EPA review, that apply to initial Permit issuance.
[391-3-1-.03(10)(e)3(i)]

8.5.3 Notwithstanding the provisions in 8.5.1 above, if the Division has received a timely and complete application for renewal, deemed it administratively complete, and failed to reissue the Permit for reasons other than cause, authorization to operate shall continue beyond the expiration date to the point of Permit modification, reissuance, or revocation.
[391-3-1-.03(10)(e)3(iii)]

8.6 Transfer of Ownership or Operation

8.6.1 This Permit is not transferable by the Permittee. Future owners and operators shall obtain a new Permit from the Director. The new Permit may be processed as an administrative amendment if no other change in this Permit is necessary, and provided that a written agreement containing a specific date for transfer of Permit responsibility coverage and liability between the current and new Permittee has been submitted to the Division at least thirty (30) days in advance of the transfer.
[391-3-1-.03(4)]

8.7 Property Rights

8.7.1 This Permit shall not convey property rights of any sort, or any exclusive privileges.
[391-3-1-.03(10)(d)1(i) and 40 CFR 70.6(a)(6)(iv)]

8.8 Submissions

8.8.1 Reports, test data, monitoring data, notifications, annual certifications, and requests for revision and renewal shall be submitted to:

Georgia Department of Natural Resources
Environmental Protection Division
Air Protection Branch
Atlanta Tradeport, Suite 120
4244 International Parkway
Atlanta, Georgia 30354-3908

8.8.2 Any records, compliance certifications, and monitoring data required by the provisions in this Permit to be submitted to the EPA shall be sent to:

Air and EPCRA Enforcement Branch – U. S. EPA Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, Georgia 30303-3104

8.8.3 Any application form, report, or compliance certification submitted pursuant to this Permit shall contain a certification by a responsible official of its truth, accuracy, and completeness. This certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.
[391-3-1-.03(10)(c)2, 40 CFR 70.5(d) and 40 CFR 70.6(c)(1)]

8.8.4 Unless otherwise specified, all submissions under this permit shall be submitted to the Division only.

8.9 Duty to Provide Information

8.9.1 The Permittee, upon becoming aware that any relevant facts were omitted or incorrect information was submitted in the Permit application, shall promptly submit such supplementary facts or corrected information to the Division.
[391-3-1-.03(10)(c)5]

8.9.2 The Permittee shall furnish to the Division, in writing, information that the Division may request to determine whether cause exists for modifying, revoking and reissuing, or terminating the Permit, or to determine compliance with the Permit. Upon request, the Permittee shall also furnish to the Division copies of records that the Permittee is required to keep by this Permit or, for information claimed to be confidential, the Permittee may furnish such records directly to the EPA, if necessary, along with a claim of confidentiality.
[391-3-1-.03(10)(d)1(i) and 40 CFR 70.6(a)(6)(v)]

8.10 Modifications

8.10.1 Prior to any source commencing a modification as defined in 391-3-1-.01(pp) that may result in air pollution and not exempted by 391-3-1-.03(6), the Permittee shall submit a Permit application to the Division. The application shall be submitted sufficiently in advance of any critical date involved to allow adequate time for review, discussion, or revision of plans, if necessary. Such application shall include, but not be limited to, information describing the precise nature of the change, modifications to any emission control system, production capacity of the plant before and after the change, and the anticipated completion date of the change. The application shall be in the form of a Georgia air quality Permit application to construct or modify (otherwise known as a SIP application) and shall be submitted on forms supplied by the Division, unless otherwise notified by the Division.
[391-3-1-.03(1) through (8)]

8.11 Permit Revision, Revocation, Reopening and Termination

8.11.1 This Permit may be revised, revoked, reopened and reissued, or terminated for cause by the Director. The Permit will be reopened for cause and revised accordingly under the following circumstances:
[391-3-1-.03(10)(d)1(i)]

a. If additional applicable requirements become applicable to the source and the remaining Permit term is three (3) years or longer. In this case, the reopening shall be completed no later than eighteen (18) months after promulgation of the applicable requirement. A reopening shall not be required if compliance with the applicable requirement is not required until after the date on which the Permit is due to expire;
[391-3-1-.03(10)(e)6(i)(I)]

b. If any additional applicable requirements of the Acid Rain Program become applicable to the source;
[391-3-1-.03(10)(e)6(i)(II)] (Acid Rain sources only)

c. The Director determines that the Permit contains a material mistake or inaccurate statements were made in establishing the emissions standards or other terms or conditions of the Permit; or
[391-3-1-.03(10)(e)6(i)(III) and 40 CFR 70.7(f)(1)(iii)]

d. The Director determines that the Permit must be revised or revoked to assure compliance with the applicable requirements.
[391-3-1-.03(10)(e)6(i)(IV) and 40 CFR 70.7(f)(1)(iv)]

8.11.2 Proceedings to reopen and reissue a Permit shall follow the same procedures as applicable to initial Permit issuance and shall affect only those parts of the Permit for which cause to reopen exists. Reopenings shall be made as expeditiously as practicable.
[391-3-1-.03(10)(e)6(ii)]

8.11.3 Reopenings shall not be initiated before a notice of intent to reopen is provided to the source by the Director at least thirty (30) days in advance of the date the Permit is to be reopened, except that the Director may provide a shorter time period in the case of an emergency.
[391-3-1-.03(10)(e)6(iii)]

8.11.4 All Permit conditions remain in effect until such time as the Director takes final action. The filing of a request by the Permittee for any Permit revision, revocation, reissuance, or termination, or of a notification of planned changes or anticipated noncompliance, shall not stay any Permit condition.
[391-3-1-.03(10)(d)1(i) and 40 CFR 70.6(a)(6)(iii)]

8.11.5 **State Only Enforceable Condition**
At any time that the Director determines that additional control of emissions from the facility may reasonably be needed to provide for the continued protection of public health, safety and welfare, the Division reserves the right to amend the provisions of this Permit pursuant to the Division's authority as established in the Georgia Air Quality Act and the rules adopted pursuant to that Act.
[391-3-1-.02(2)(a)3]

8.11.6 A Permit revision shall not be required for changes that are explicitly authorized by the conditions of this Permit.

8.11.7 A Permit revision shall not be required for changes that are part of an approved economic incentive, marketable Permit, emission trading, or other similar program or process for change which is specifically provided for in this Permit.
[391-3-1-.03(10)(d)1(i) and 40 CFR 70.6(a)(8)]

8.12 Severability

8.12.1 Any condition or portion of this Permit which is challenged, becomes suspended or is ruled invalid as a result of any legal or other action shall not invalidate any other portion or condition of this Permit.
[391-3-1-.03(10)(d)1(i) and 40 CFR 70.6(a)(5)]

8.13 Excess Emissions Due to an Emergency

8.13.1 An "emergency" means any situation arising from sudden and reasonably unforeseeable events beyond the control of the source, including acts of God, which situation requires immediate corrective action to restore normal operation, and that causes the source to exceed a technology-based emission limitation under the Permit, due to unavoidable increases in emissions attributable to the emergency. An emergency shall not include noncompliance to the extent caused by improperly designed equipment, lack of preventative maintenance, careless or improper operation, or operator error.
[391-3-1-.03(10)(d)7 and 40 CFR 70.6(g)(1)]

8.13.2 An emergency shall constitute an affirmative defense to an action brought for noncompliance with the technology-based emission limitations if the Permittee demonstrates, through properly signed contemporaneous operating logs or other relevant evidence, that:
[391-3-1-.03(10)(d)7 and 40 CFR 70.6(g)(2) and (3)]

a. An emergency occurred and the Permittee can identify the cause(s) of the emergency;

b. The Permitted facility was at the time of the emergency being properly operated;

c. During the period of the emergency, the Permittee took all reasonable steps to minimize levels of emissions that exceeded the emissions standards, or other requirements in the Permit; and

d. The Permittee promptly notified the Division and submitted written notice of the emergency to the Division within two (2) working days of the time when emission limitations were exceeded due to the emergency. This notice must contain a description of the emergency, any steps taken to mitigate emissions, and corrective actions taken.

8.13.3 In an enforcement proceeding, the Permittee seeking to establish the occurrence of an emergency shall have the burden of proof.
[391-3-1-.03(10)(d)7 and 40 CFR 70.6(g)(4)]

8.13.4 The emergency conditions listed above are in addition to any emergency or upset provisions contained in any applicable requirement.
[391-3-1-.03(10)(d)7 and 40 CFR 70.6(g)(5)]

8.14 Compliance Requirements

8.14.1 Compliance Certification

The Permittee shall provide written certification to the Division and to the EPA, at least annually, of compliance with the conditions of this Permit. The annual written certification shall be postmarked no later than February 28 of each year and shall be submitted to the Division and to the EPA. The certification shall include, but not be limited to, the following elements:
[391-3-1-.03(10)(d)3 and 40 CFR 70.6(c)(5)]

a. The identification of each term or condition of the Permit that is the basis of the certification;

b. The status of compliance with the terms and conditions of the permit for the period covered by the certification, including whether compliance during the period was continuous or intermittent, based on the method or means designated in paragraph c below. The certification shall identify each deviation and take it into account in the compliance certification. The certification shall also identify as possible exceptions to compliance any periods during which compliance is required and in which an excursion or exceedance as defined under 40 CFR Part 64 occurred;

c. The identification of the method(s) or other means used by the owner or operator for determining the compliance status with each term and condition during the certification period;

d. Any other information that must be included to comply with section 113(c)(2) of the Act, which prohibits knowingly making a false certification or omitting material information; and

e. Any additional requirements specified by the Division.

8.14.2 Inspection and Entry

a. Upon presentation of credentials and other documents as may be required by law, the Permittee shall allow authorized representatives of the Division to perform the following:
[391-3-1-.03(10)(d)3 and 40 CFR 70.6(c)(2)]

i. Enter upon the Permittee's premises where a Part 70 source is located or an emissions-related activity is conducted, or where records must be kept under the conditions of this Permit;
ii. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this Permit;
iii. Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this Permit; and
iv. Sample or monitor any substances or parameters at any location during operating hours for the purpose of assuring Permit compliance or compliance with applicable requirements as authorized by the Georgia Air Quality Act.

b. No person shall obstruct, hamper, or interfere with any such authorized representative while in the process of carrying out his official duties. Refusal of entry or access may constitute grounds for Permit revocation and assessment of civil penalties.
[391-3-1-.07 and 40 CFR 70.11(a)(3)(i)]

8.14.3 Schedule of Compliance

a. For applicable requirements with which the Permittee is in compliance, the Permittee shall continue to comply with those requirements.
[391-3-1-.03(10)(c)2 and 40 CFR 70.5(c)(8)(iii)(A)]

b. For applicable requirements that become effective during the Permit term, the Permittee shall meet such requirements on a timely basis unless a more detailed schedule is expressly required by the applicable requirement.
[391-3-1-.03(10)(c)2 and 40 CFR 70.5(c)(8)(iii)(B)]

c. Any schedule of compliance for applicable requirements with which the source is not in compliance at the time of Permit issuance shall be supplemental to, and shall not sanction noncompliance with, the applicable requirements on which it is based.
[391-3-1-.03(10)(c)2 and 40 CFR 70.5(c)(8)(iii)(C)]

8.14.4 Excess Emissions

a. Excess emissions resulting from startup, shutdown, or malfunction of any source which occur though ordinary diligence is employed shall be allowed provided that:
[391-3-1-.02(2)(a)7(i)]

i. The best operational practices to minimize emissions are adhered to;

ii. All associated air pollution control equipment is operated in a manner consistent with good air pollution control practice for minimizing emissions; and

iii. The duration of excess emissions is minimized.

b. Excess emissions which are caused entirely or in part by poor maintenance, poor operation, or any other equipment or process failure which may reasonably be prevented during startup, shutdown or malfunction are prohibited and are violations of Chapter 391-3-1 of the Georgia Rules for Air Quality Control.
[391-3-1-.02(2)(a)7(ii)]

c. The provisions of this condition and Georgia Rule 391-3-1-.02(2)(a)7 shall apply only to those sources which are not subject to any requirement under Georgia Rule 391-3-1-.02(8) – New Source Performance Standards or any requirement of 40 CFR, Part 60, as amended concerning New Source Performance Standards.
[391-3-1-.02(2)(a)7(iii)]

8.15 Circumvention

State Only Enforceable Condition.

8.15.1 The Permittee shall not build, erect, install, or use any article, machine, equipment or process the use of which conceals an emission which would otherwise constitute a violation of an applicable emission standard. Such concealment includes, but is not limited to, the use of gaseous diluents to achieve compliance with an opacity standard or with a standard which is based on the concentration of the pollutants in the gases discharged into the atmosphere.
[391-3-1-.03(2)(c)]

8.16 Permit Shield

8.16.1 Compliance with the terms of this Permit shall be deemed compliance with all applicable requirements as of the date of Permit issuance provided that all applicable requirements are included and specifically identified in the Permit.
[391-3-1-.03(10)(d)6]

8.16.2 Any Permit condition identified as "State only enforceable" does not have a Permit shield.

8.17 Operational Practices

8.17.1 At all times, including periods of startup, shutdown, and malfunction, the Permittee shall maintain and operate the source, including associated air pollution control equipment, in a manner consistent with good air pollution control practice for minimizing emissions. Determination of whether acceptable operating and maintenance procedures are being used will be based on any information available to the Division that may include, but is not limited to, monitoring results, observations of the opacity or other characteristics of emissions, review of operating and maintenance procedures or records, and inspection or surveillance of the source.
[391-3-1-.02(2)(a)10]

State Only Enforceable Condition.

8.17.2 No person owning, leasing, or controlling, the operation of any air contaminant sources shall willfully, negligently or through failure to provide necessary equipment or facilities or to take necessary precautions, cause, permit, or allow the emission from said air contamination source or sources, of such quantities of air contaminants as will cause, or tend to cause, by themselves, or in conjunction with other air contaminants, a condition of air pollution in quantities or characteristics or of a duration which is injurious or which unreasonably interferes with the enjoyment of life or use of property in such area of the State as is affected thereby. Complying with Georgia's Rules for Air Quality Control Chapter 391-3-1 and Conditions in this Permit, shall in no way exempt a person from this provision.
[391-3-1-.02(2)(a)1]

8.18 Visible Emissions

8.18.1 Except as may be provided in other provisions of this Permit, the Permittee shall not cause, let, suffer, permit or allow emissions from any air contaminant source the opacity of which is equal to or greater than forty (40) percent.
[391-3-1-.02(2)(b)1]

8.19 Fuel-burning Equipment

8.19.1 The Permittee shall not cause, let, suffer, permit, or allow the emission of fly ash and/or other particulate matter from any fuel-burning equipment with rated heat input capacity of less than 10 million Btu per hour, in operation or under construction on or before January 1, 1972 in amounts equal to or exceeding 0.7 pounds per million BTU heat input.
[391-3-1-.02(2)(d)]

8.19.2 The Permittee shall not cause, let, suffer, permit, or allow the emission of fly ash and/or other particulate matter from any fuel-burning equipment with rated heat input capacity of less than 10 million Btu per hour, constructed after January 1, 1972 in amounts equal to or exceeding 0.5 pounds per million BTU heat input.
[391-3-1-.02(2)(d)]

8.19.3 The Permittee shall not cause, let, suffer, permit, or allow the emission from any fuel-burning equipment constructed or extensively modified after January 1, 1972, visible emissions the opacity of which is equal to or greater than twenty (20) percent except for one six minute period per hour of not more than twenty-seven (27) percent opacity.
[391-3-1-.02(2)(d)]

8.20 Sulfur Dioxide

8.20.1 Except as may be specified in other provisions of this Permit, the Permittee shall not burn fuel containing more than 2.5 percent sulfur, by weight, in any fuel burning source that has a heat input capacity below 100 million Btu's per hour.
[391-3-1-.02(2)(g)]

8.21 Particulate Emissions

8.21.1 Except as may be specified in other provisions of this Permit, the Permittee shall not cause, let, permit, suffer, or allow the rate of emission from any source, particulate matter in total quantities equal to or exceeding the allowable rates shown below. Equipment in operation, or under construction contract, on or before July 2, 1968, shall be considered existing equipment. All other equipment put in operation or extensively altered after said date is to be considered new equipment.
[391-3-1-.02(2)(e)]

a. The following equations shall be used to calculate the allowable rates of emission from new equipment:

$E = 4.1P^{0.67}$; for process input weight rate up to and including 30 tons per hour.
$E = 55P^{0.11} - 40$; for process input weight rate above 30 tons per hour.

b. The following equation shall be used to calculate the allowable rates of emission from existing equipment:

$E = 4.1P^{0.67}$

In the above equations, E = emission rate in pounds per hour, and
P = process input weight rate in tons per hour.

8.22 Fugitive Dust
[391-3-1-.02(2)(n)]

8.22.1 Except as may be specified in other provisions of this Permit, the Permittee shall take all reasonable precautions to prevent dust from any operation, process, handling, transportation or storage facility from becoming airborne. Reasonable precautions that could be taken to prevent dust from becoming airborne include, but are not limited to, the following:

a. Use, where possible, of water or chemicals for control of dust in the demolition of existing buildings or structures, construction operations, the grading of roads or the clearing of land;

b. Application of asphalt, water, or suitable chemicals on dirt roads, materials, stockpiles, and other surfaces that can give rise to airborne dusts;

c. Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials. Adequate containment methods can be employed during sandblasting or other similar operations;

d. Covering, at all times when in motion, open bodied trucks transporting materials likely to give rise to airborne dusts; and

e. The prompt removal of earth or other material from paved streets onto which earth or other material has been deposited.

8.22.2 The opacity from any fugitive dust source shall not equal or exceed 20 percent.

8.23 Solvent Metal Cleaning

8.23.1 Except as may be specified in other provisions of this Permit, the Permittee shall not cause, suffer, allow, or permit the operation of a cold cleaner degreaser unless the following requirements for control of emissions of the volatile organic compounds are satisfied: [391-3-1-.02(2)(ff)1]

a. The degreaser shall be equipped with a cover to prevent escape of VOC during periods of non-use,

b. The degreaser shall be equipped with a device to drain cleaned parts before removal from the unit,

c. If the solvent volatility is 0.60 psi or greater measured at 100 ºF, or if the solvent is heated above 120 ºF, then one of the following control devices must be used:

i. The degreaser shall be equipped with a freeboard that gives a freeboard ratio of 0.7 or greater, or

ii. The degreaser shall be equipped with a water cover (solvent must be insoluble in and heavier than water), or

iii. The degreaser shall be equipped with a system of equivalent control, including but not limited to, a refrigerated chiller or carbon adsorption system.

d. Any solvent spray utilized by the degreaser must be in the form of a solid, fluid stream (not a fine, atomized or shower type spray) and at a pressure which will not cause excessive splashing, and

e. All waste solvent from the degreaser shall be stored in covered containers and shall not be disposed of by such a method as to allow excessive evaporation into the atmosphere.

8.24 Incinerators

8.24.1 Except as specified in the section dealing with conical burners, no person shall cause, let, suffer, permit, or allow the emissions of fly ash and/or other particulate matter from any incinerator, in amounts equal to or exceeding the following:
[391-3-1-.02(2)(c)1-4]

a. Units with charging rates of 500 pounds per hour or less of combustible waste, including water, shall not emit fly ash and/or particulate matter in quantities exceeding 1.0 pound per hour.

b. Units with charging rates in excess of 500 pounds per hour of combustible waste, including water, shall not emit fly ash and/or particulate matter in excess of 0.20 pounds per 100 pounds of charge.

8.24.2 No person shall cause, let, suffer, permit, or allow from any incinerator, visible emissions the opacity of which is equal to or greater than twenty (20) percent except for one six minute period per hour of not more than twenty-seven (27) percent opacity.

8.24.3 No person shall cause or allow particles to be emitted from an incinerator which are individually large enough to be visible to the unaided eye.

8.24.4 No person shall operate an existing incinerator unless:

a. It is a multiple chamber incinerator;

b. It is equipped with an auxiliary burner in the primary chamber for the purpose of creating a pre-ignition temperature of 800^{o}F; and

c. It has a secondary burner to control smoke and/or odors and maintain a temperature of at least 1500^{o}F in the secondary chamber.

8.25 Volatile Organic Liquid Handling and Storage

8.25.1 The Permittee shall ensure that each storage tank subject to the requirements of Rule 391-3-1-.02(2)(vv) "Volatile Organic Liquid Handling and Storage" is equipped with submerged fill pipes. For the purposes of this condition and the permit, a submerged fill pipe is defined as any fill pipe with a discharge opening which is within six inches of the tank bottom.
[391-3-1-.02(2)(vv)(1)]

8.26 Use of Any Credible Evidence or Information

8.26.1 Notwithstanding any other provisions of any applicable rule or regulation or requirement of this permit, for the purpose of submission of compliance certifications or establishing whether or not a person has violated or is in violation of any emissions limitation or standard, nothing in this permit or any Emission Limitation or Standard to which it pertains, shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether a source would have been in compliance with applicable requirements if the appropriate performance or compliance test or procedure had been performed.
[391-3-1-.02(3)(a)]

8.27 Diesel-Fired Internal Combustion Engines

8.27.1 The Permittee shall comply with all applicable provisions of New Source Performance Standards (NSPS) Federal Rule 40 CFR Part 60 Subpart A-"General Provisions" and Subpart IIII-"Standards for Stationary Compression Ignition Internal Combustion Engines," for diesel-fired internal combustion engine(s) manufactured after April 1, 2006 or modified/reconstructed after July 11, 2005. Such requirements include but are not limited to:
[40 CFR 60.4205(b), 391-3-1-.02(8)(b)77]

a. Equip all emergency generator engines with non-resettable hour meters

b. Purchase only diesel fuel with a maximum sulfur content of 15 ppm unless otherwise specified by the Division.

Attachments

A. List of Standard Abbreviations and List of Permit Specific Abbreviations
B. Insignificant Activities Checklist, Insignificant Activities Based on Emission Levels and Generic Emission Groups
C. List of References
D. U.S. EPA Acid Rain Program Phase II Permit Application
E CAIR Permit Application for SO2 and NOx Annual Trading Programs

ATTACHMENT A

List Of Standard Abbreviations

AIRS	Aerometric Information Retrieval System
APCD	Air Pollution Control Device
ASTM	American Society for Testing and Materials
BACT	Best Available Control Technology
BTU	British Thermal Unit
CAAA	Clean Air Act Amendments
CEMS	Continuous Emission Monitoring System
CERMS	Continuous Emission Rate Monitoring System
CFR	Code of Federal Regulations
CMS	Continuous Monitoring System(s)
CO	Carbon Monoxide
COMS	Continuous Opacity Monitoring System
dscf/dscm	Dry Standard Cubic Foot / Dry Standard Cubic Meter
EPA	United States Environmental Protection Agency
EPCRA	Emergency Planning and Community Right to Know Act
gr	Grain(s)
GPM (gpm)	Gallons per minute
H_2O (H2O)	Water
HAP	Hazardous Air Pollutant
HCFC	Hydro-chloro-fluorocarbon
MACT	Maximum Achievable Control Technology
MMBtu	Million British Thermal Units
MMBtu/hr	Million British Thermal Units per hour
MVAC	Motor Vehicle Air Conditioner
MW	Megawatt
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_x (NOx)	Nitrogen Oxides
NSPS	New Source Performance Standards
OCGA	Official Code of Georgia Annotated

PM	Particulate Matter
PM_{10} (PM10)	Particulate Matter less than 10 micrometers in diameter
PPM (ppm)	Parts per Million
PSD	Prevention of Significant Deterioration
RACT	Reasonably Available Control Technology
RMP	Risk Management Plan
SIC	Standard Industrial Classification
SIP	State Implementation Plan
SO_2 (SO2)	Sulfur Dioxide
USC	United States Code
VE	Visible Emissions
VOC	Volatile Organic Compound

List of Permit Specific Abbreviations

ESP	Electrostatic Precipitator
PCB	Poluchlorinated Biphenyl

ATTACHMENT B

NOTE: Attachment B contains information regarding insignificant emission units/activities and groups of generic emission units/activities in existence at the facility at the time of Permit issuance. Future modifications or additions of insignificant emission units/activities and equipment that are part of generic emissions groups may not necessarily cause this attachment to be updated.

INSIGNIFICANT ACTIVITIES CHECKLIST

Category	Description of Insignificant Activity/Unit	Quantity
Mobile Sources	1. Cleaning and sweeping of streets and paved surfaces	X
Combustion Equipment	1. Fire fighting and similar safety equipment used to train fire fighters or other emergency personnel.	X
	2. Small incinerators that are not subject to any standard, limitation or other requirement under Section 111 or 112 (excluding 112(r)) of the Federal Act and are not considered a "designated facility" as specified in 40 CFR 60.32e of the Federal emissions guidelines for Hospital/Medical/Infectious Waste Incinerators, that are operating as follows:	N/A
	i) Less than 8 million BTU/hr heat input, firing types 0, 1, 2, and/or 3 waste.	N/A
	ii) Less than 8 million BTU/hr heat input with no more than 10% pathological (type 4) waste by weight combined with types 0, 1, 2, and/or 3 waste.	N/A
	iii) Less than 4 million BTU/hr heat input firing type 4 waste. (Refer to 391-3-1-.03(10)(g)2.(ii) for descriptions of waste types)	N/A
	3. Open burning in compliance with Georgia Rule 391-3-1-.02 (5).	X
	4. Stationary engines burning: i) Natural gas, LPG, gasoline, dual fuel, or diesel fuel which are used exclusively as emergency generators shall not exceed 500 hours per year or 200 hours per year if subject to Georgia Rule 391-3-1-.02(2)(mmm).7	2
	ii) Natural gas, LPG, and/or diesel fueled generators used for emergency, peaking, and/or standby power generation, where the combined peaking and standby power generation do not exceed 200 hours per year.	N/A
	iii) Natural gas, LPG, and/or diesel fuel used for other purposes, provided that the output of each engine does not exceed 400 horsepower and that no individual engine operates for more than 2,000 hours per year.	5
	iv) Gasoline used for other purposes, provided that the output of each engine does not exceed 100 horsepower and that no individual engine operates for more than 500 hours per year.	2
Trade Operations	1. Brazing, soldering, and welding equipment, and cutting torches related to manufacturing and construction activities whose emissions of hazardous air pollutants (HAPs) fall below 1,000 pounds per year.	X
Maintenance, Cleaning, and Housekeeping	1. Blast-cleaning equipment using a suspension of abrasive in water and any exhaust system (or collector) serving them exclusively.	N/A
	2. Portable blast-cleaning equipment.	X
	3. Non-Perchloroethylene Dry-cleaning equipment with a capacity of 100 pounds per hour or less of clothes.	N/A
	4. Cold cleaners having an air/vapor interface of not more than 10 square feet and that do not use a halogenated solvent.	2
	5. Non-routine clean out of tanks and equipment for the purposes of worker entry or in preparation for maintenance or decommissioning.	X
	6. Devices used exclusively for cleaning metal parts or surfaces by burning off residual amounts of paint, varnish, or other foreign material, provided that such devices are equipped with afterburners.	N/A
	7. Cleaning operations: Alkaline phosphate cleaners and associated cleaners and burners.	N/A

INSIGNIFICANT ACTIVITIES CHECKLIST

Category	Description of Insignificant Activity/Unit	Quantity
Laboratories and Testing	1. Laboratory fume hoods and vents associated with bench-scale laboratory equipment used for physical or chemical analysis.	2
	2. Research and development facilities, quality control testing facilities and/or small pilot projects, where combined daily emissions from all operations are not individually major or are support facilities not making significant contributions to the product of a collocated major manufacturing facility.	N/A
Pollution Control	1. Sanitary waste water collection and treatment systems, except incineration equipment or equipment subject to any standard, limitation or other requirement under Section 111 or 112 (excluding 112(r)) of the Federal Act.	3
	2. On site soil or groundwater decontamination units that are not subject to any standard, limitation or other requirement under Section 111 or 112 (excluding 112(r)) of the Federal Act.	N/A
	3. Bioremediation operations units that are not subject to any standard, limitation or other requirement under Section 111 or 112 (excluding 112(r)) of the Federal Act.	N/A
	4. Landfills that are not subject to any standard, limitation or other requirement under Section 111 or 112 (excluding 112(r)) of the Federal Act.	N/A
Industrial Operations	1. Concrete block and brick plants, concrete products plants, and ready mix concrete plants producing less than 125,000 tons per year.	N/A
	2. Any of the following processes or process equipment which are electrically heated or which fire natural gas, LPG or distillate fuel oil at a maximum total heat input rate of not more than 5 million BTU's per hour:	N/A
	i) Furnaces for heat treating glass or metals, the use of which do not involve molten materials or oil-coated parts.	N/A
	ii) Porcelain enameling furnaces or porcelain enameling drying ovens.	N/A
	iii) Kilns for firing ceramic ware.	N/A
	iv) Crucible furnaces, pot furnaces, or induction melting and holding furnaces with a capacity of 1,000 pounds or less each, in which sweating or distilling is not conducted and in which fluxing is not conducted utilizing free chlorine, chloride or fluoride derivatives, or ammonium compounds.	N/A
	v) Bakery ovens and confection cookers.	N/A
	vi) Feed mill ovens.	N/A
	vii) Surface coating drying ovens	N/A
	3. Carving, cutting, routing, turning, drilling, machining, sawing, surface grinding, sanding, planing, buffing, shot blasting, shot peening, or polishing; ceramics, glass, leather, metals, plastics, rubber, concrete, paper stock or wood, also including roll grinding and ground wood pulping stone sharpening, provided that: i) Activity is performed indoors; & ii) No significant fugitive particulate emissions enter the environment; & iii) No visible emissions enter the outdoor atmosphere.	X
	4. Photographic process equipment by which an image is reproduced upon material sensitized to radiant energy (e.g., blueprint activity, photographic developing and microfiche).	N/A
	5. Grain, food, or mineral extrusion processes	N/A
	6. Equipment used exclusively for sintering of glass or metals, but not including equipment used for sintering metal-bearing ores, metal scale, clay, fly ash, or metal compounds.	N/A
	7. Equipment for the mining and screening of uncrushed native sand and gravel.	N/A
	8. Ozonization process or process equipment.	N/A
	9. Electrostatic powder coating booths with an appropriately designed and operated particulate control system.	N/A
	10. Activities involving the application of hot melt adhesives where VOC emissions are less than 5 tons per year and HAP emissions are less than 1,000 pounds per year.	N/A
	11. Equipment used exclusively for the mixing and blending water-based adhesives and coatings at ambient temperatures.	N/A
	12. Equipment used for compression, molding and injection of plastics where VOC emissions are less than 5 tons per year and HAP emissions are less than 1,000 pounds per year.	N/A
	13. Ultraviolet curing processes where VOC emissions are less than 5 tons per year and HAP emissions are less than 1,000 pounds per year.	N/A

INSIGNIFICANT ACTIVITIES CHECKLIST

Category	Description of Insignificant Activity/Unit	Quantity
Storage Tanks and Equipment	1. All petroleum liquid storage tanks storing a liquid with a true vapor pressure of equal to or less than 0.50 psia as stored.	2
	2. All petroleum liquid storage tanks with a capacity of less than 40,000 gallons storing a liquid with a true vapor pressure of equal to or less than 2.0 psia as stored that are not subject to any standard, limitation or other requirement under Section 111 or 112 (excluding 112(r)) of the Federal Act.	N/A
	3. All petroleum liquid storage tanks with a capacity of less than 10,000 gallons storing a petroleum liquid.	13
	4. All pressurized vessels designed to operate in excess of 30 psig storing petroleum fuels that are not subject to any standard, limitation or other requirement under Section 111 or 112 (excluding 112(r)) of the Federal Act.	N/A
	5. Gasoline storage and handling equipment at loading facilities handling less than 20,000 gallons per day or at vehicle dispensing facilities that are not subject to any standard, limitation or other requirement under Section 111 or 112 (excluding 112(r)) of the Federal Act.	2
	6. Portable drums, barrels, and totes provided that the volume of each container does not exceed 550 gallons.	99
	7. All chemical storage tanks used to store a chemical with a true vapor pressure of less than or equal to 10 millimeters of mercury (0.19 psia).	12

INSIGNIFICANT ACTIVITIES BASED ON EMISSION LEVELS

Description of Emission Units / Activities	Quantity
N/A	N/A

ATTACHMENT B (continued)

GENERIC EMISSION GROUPS

Emission units/activities appearing in the following table are subject only to one or more of Georgia Rules 391-3-1-.02 (2) (b), (e) &/or (n). Potential emissions of particulate matter, from these sources based on TSP, are less than 25 tons per year per process line or unit in each group. Any emissions unit subject to a NESHAP, NSPS, or any specific Air Quality Permit Condition(s) are not included in this table.

Description of Emissions Units / Activities	Number of Units (if appropriate)	Applicable Rules		
		Opacity Rule (b)	PM from Mfg Process Rule (e)	Fugitive Dust Rule (n)
N/A	N/A	N/A	N/A	N/A

The following table includes groups of fuel burning equipment subject only to Georgia Rules 391-3-1-.02 (2) (b) & (d).Any emissions unit subject to a NESHAP, NSPS, or any specific Air Quality Permit Condition(s) are not included in this table.

Description of Fuel Burning Equipment	Number of Units
Fuel burning equipment with a rated heat input capacity of less than 10 million BTU/hr burning only natural gas and/or LPG.	N/A
Fuel burning equipment with a rated heat input capacity of less than 5 million BTU/hr, burning only distillate fuel oil, natural gas and/or LPG.	N/A
Any fuel burning equipment with a rated heat input capacity of 1 million BTU/hr or less.	N/A

ATTACHMENT C

LIST OF REFERENCES

1. The Georgia Rules for Air Quality Control Chapter 391-3-1. All Rules cited herein which begin with 391-3-1 are State Air Quality Rules.

2. Title 40 of the Code of Federal Regulations; specifically 40 CFR Parts 50, 51, 52, 60, 61, 63, 64, 68, 70, 72, 73, 75, 76 and 82. All rules cited with these parts are Federal Air Quality Rules.

3. ***Georgia Department of Natural Resources, Environmental Protection Division, Air Protection Branch, Procedures for Testing and Monitoring Sources of Air Pollutants.***

4. ***Georgia Department of Natural Resources, Environmental Protection Division, Air Protection Branch, Procedures for Calculating Air Permit Fees***.

5. Compilation of Air Pollutant Emission Factors, AP-42, Fifth Edition, Volume I: Stationary Point and Area Sources. This information may be obtained from EPA's TTN web site at *www.epa.gov/ttn/chief/ap42/index.html*.

6. The latest properly functioning version of EPA's **TANKS** emission estimation software. The software may be obtained from EPA's TTN web site at *www.epa.gov/ttn/chief/software/tanks/index.html*.

7. The Clean Air Act (42 U.S.C. 7401 et seq).

8. White Paper for Streamlined Development of Part 70 Permit Applications, July 10, 1995 (White Paper #1).

9. White Paper Number 2 for Improved Implementation of the Part 70 Operating Permits Program, March 5, 1996 (White Paper #2).

ATTACHMENT D

U.S. EPA ACID RAIN PROGRAM PERMIT APPLICATION FOR PHASE II NO_X AVERAGING PLAN

19949
19763

United States
Environmental Protection Agency
Acid Rain Program

OMB No. 2060-0258
Approval expires 11/30/2012

EPA

Acid Rain Permit Application

RECEIVED
SEP 29 2010
AIR PROTECTION BRANCH

For more information, see instructions and 40 CFR 72.30 and 72.31.

This submission is: ~ new ~ revised X for Acid Rain permit renewal

STEP 1

Identify the facility name, State, and plant (ORIS) code.

Facility (Source) Name: Hammond	State: GA	Plant Code: 708

STEP 2

Enter the unit ID# for every affected unit at the affected source in column "a."

a	b
Unit ID#	Unit Will Hold Allowances in Accordance with 40 CFR 72.9(c)(1)
1	Yes
2	Yes
3	Yes
4	Yes
	Yes,
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes
	Yes

Facility (Source) Name (from STEP 1): Hammond

STEP 3

Read the standard requirements.

Permit Requirements

(1) The designated representative of each affected source and each affected unit at the source shall:

(i) Submit a complete Acid Rain permit application (including a compliance plan) under 40 CFR part 72 in accordance with the deadlines specified in 40 CFR 72.30; and

(ii) Submit in a timely manner any supplemental information that the permitting authority determines is necessary in order to review an Acid Rain permit application and issue or deny an Acid Rain permit;

(2) The owners and operators of each affected source and each affected unit at the source shall:

(i) Operate the unit in compliance with a complete Acid Rain permit application or a superseding Acid Rain permit issued by the permitting authority; and

(ii) Have an Acid Rain Permit.

Monitoring Requirements

(1) The owners and operators and, to the extent applicable, designated representative of each affected source and each affected unit at the source shall comply with the monitoring requirements as provided in 40 CFR part 75.

(2) The emissions measurements recorded and reported in accordance with 40 CFR part 75 shall be used to determine compliance by the source or unit, as appropriate, with the Acid Rain emissions limitations and emissions reduction requirements for sulfur dioxide and nitrogen oxides under the Acid Rain Program.

(3) The requirements of 40 CFR part 75 shall not affect the responsibility of the owners and operators to monitor emissions of other pollutants or other emissions characteristics at the unit under other applicable requirements of the Act and other provisions of the operating permit for the source.

Sulfur Dioxide Requirements

(1) The owners and operators of each source and each affected unit at the source shall:

(i) Hold allowances, as of the allowance transfer deadline, in the source's compliance account (after deductions under 40 CFR 73.34(c)), not less than the total annual emissions of sulfur dioxide for the previous calendar year from the affected units at the source; and

(ii) Comply with the applicable Acid Rain emissions limitations for sulfur dioxide.

(2) Each ton of sulfur dioxide emitted in excess of the Acid Rain emissions limitations for sulfur dioxide shall constitute a separate violation of the Act.

(3) An affected unit shall be subject to the requirements under paragraph (1) of the sulfur dioxide requirements as follows:

(i) Starting January 1, 2000, an affected unit under 40 CFR 72.6(a)(2); or

(ii) Starting on the later of January 1, 2000 or the deadline for monitor certification under 40 CFR part 75, an affected unit under 40 CFR 72.6(a)(3).

Facility (Source) Name (from STEP 1): Hammond

Sulfur Dioxide Requirements, Cont'd.

STEP 3, Cont'd.

(4) Allowances shall be held in, deducted from, or transferred among Allowance Tracking System accounts in accordance with the Acid Rain Program.
(5) An allowance shall not be deducted in order to comply with the requirements under paragraph (1) of the sulfur dioxide requirements prior to the calendar year for which the allowance was allocated.
(6) An allowance allocated by the Administrator under the Acid Rain Program is a limited authorization to emit sulfur dioxide in accordance with the Acid Rain Program. No provision of the Acid Rain Program, the Acid Rain permit application, the Acid Rain permit, or an exemption under 40 CFR 72.7 or 72.8 and no provision of law shall be construed to limit the authority of the United States to terminate or limit such authorization.
(7) An allowance allocated by the Administrator under the Acid Rain Program does not constitute a property right.

Nitrogen Oxides Requirements

The owners and operators of the source and each affected unit at the source shall comply with the applicable Acid Rain emissions limitation for nitrogen oxides.

Excess Emissions Requirements

(1) The designated representative of an affected source that has excess emissions in any calendar year shall submit a proposed offset plan, as required under 40 CFR part 77.
(2) The owners and operators of an affected source that has excess emissions in any calendar year shall:
(i) Pay without demand the penalty required, and pay upon demand the interest on that penalty, as required by 40 CFR part 77; and
(ii) Comply with the terms of an approved offset plan, as required by 40 CFR part 77.

Recordkeeping and Reporting Requirements

(1) Unless otherwise provided, the owners and operators of the source and each affected unit at the source shall keep on site at the source each of the following documents for a period of 5 years from the date the document is created. This period may be extended for cause, at any time prior to the end of 5 years, in writing by the Administrator or permitting authority:
(i) The certificate of representation for the designated representative for the source and each affected unit at the source and all documents that demonstrate the truth of the statements in the certificate of representation, in accordance with 40 CFR 72.24; provided that the certificate and documents shall be retained on site at the source beyond such 5-year period until such documents are superseded because of the

submission of a new certificate of representation changing the designated representative;

STEP 3, Cont'd.

Recordkeeping and Reporting Requirements, Cont'd.

(ii) All emissions monitoring information, in accordance with 40 CFR part 75, provided that to the extent that 40 CFR part 75 provides for a 3-year period for recordkeeping, the 3-year period shall apply.
(iii) Copies of all reports, compliance certifications, and other submissions and all records made or required under the Acid Rain Program; and,
(iv) Copies of all documents used to complete an Acid Rain permit application and any other submission under the Acid Rain Program or to demonstrate compliance with the requirements of the Acid Rain Program.

(2) The designated representative of an affected source and each affected unit at the source shall submit the reports and compliance certifications required under the Acid Rain Program, including those under 40 CFR part 72 subpart I and 40 CFR part 75.

Liability

(1) Any person who knowingly violates any requirement or prohibition of the Acid Rain Program, a complete Acid Rain permit application, an Acid Rain permit, or an exemption under 40 CFR 72.7 or 72.8, including any requirement for the payment of any penalty owed to the United States, shall be subject to enforcement pursuant to section 113(c) of the Act.
(2) Any person who knowingly makes a false, material statement in any record, submission, or report under the Acid Rain Program shall be subject to criminal enforcement pursuant to section 113(c) of the Act and 18 U.S.C. 1001.
(3) No permit revision shall excuse any violation of the requirements of the Acid Rain Program that occurs prior to the date that the revision takes effect.
(4) Each affected source and each affected unit shall meet the requirements of the Acid Rain Program.
(5) Any provision of the Acid Rain Program that applies to an affected source (including a provision applicable to the designated representative of an affected source) shall also apply to the owners and operators of such source and of the affected units at the source.
(6) Any provision of the Acid Rain Program that applies to an affected unit (including a provision applicable to the designated representative of an affected unit) shall also apply to the owners and operators of such unit.
(7) Each violation of a provision of 40 CFR parts 72, 73, 74, 75, 76, 77, and 78 by an affected source or affected unit, or by an owner or operator or designated representative of such source or unit, shall be a separate violation of the Act.

Effect on Other Authorities

No provision of the Acid Rain Program, an Acid Rain permit application, an Acid Rain permit, or an exemption under 40 CFR 72.7 or 72.8 shall be construed as:

Facility (Source) Name (from STEP 1): Hammond

STEP 3, Cont'd.

(1) Except as expressly provided in title IV of the Act, exempting or excluding the owners and operators and, to the extent applicable, the designated representative of an affected source or affected unit from compliance with any other provision of the Act, including the provisions of title I of the Act relating

Effect on Other Authorities, Cont'd.

to applicable National Ambient Air Quality Standards or State Implementation Plans;
(2) Limiting the number of allowances a source can hold; *provided,* that the number of allowances held by the source shall not affect the source's obligation to comply with any other provisions of the Act;
(3) Requiring a change of any kind in any State law regulating electric utility rates and charges, affecting any State law regarding such State regulation, or limiting such State regulation, including any prudence review requirements
under such State law;
(4) Modifying the Federal Power Act or affecting the authority of the Federal Energy Regulatory Commission under the Federal Power Act; or,
(5) Interfering with or impairing any program for competitive bidding for power supply in a State in which such program is established.

STEP 4
Read the certification statement, sign, and date.

Certification

I am authorized to make this submission on behalf of the owners and operators of the affected source or affected units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Name Charles H. Huling	
Signature Charles H. Huling	Date 9/28/10

ATTACHMENT E

CAIR PERMIT APPLICATION FOR SO_2 and NO_X ANNUAL TRADING PROGRAMS

1150000.3

CAIR Permit Application

(for sources covered under a CAIR SIP)

For more information, refer to 40 CFR 96.121, 96.122, 96.221, 96.222, 96.321, and 96.322

RECEIVED

DEC 1 8 2008

18666

AIR PROTECTION BRANCH

This submission is: X New Revised

STEP 1
Identify the source by plant name, State, and ORIS or facility code

Plant Name	State	ORIS/Facility Code
Hammond	GA	708

STEP 2.
Enter the unit ID# for each CAIR unit and indicate to which CAIR programs each unit is subject (by placing an "X" in the column)

Unit ID#	NO_X Annual	SO_2	NO_X Ozone Season
1	X	X	
2	X	X	
3	X	X	
4	X	X	

STEP 3
Read the standard requirements and the certification, enter the name of the CAIR designated representative, and sign and date

Standard Requirements

(a) Permit Requirements.

(1) The CAIR designated representative of each CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) required to have a title V operating permit and each CAIR NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable) required to have a title V operating permit at the source shall:

(i) Submit to the permitting authority a complete CAIR permit application under §96.122, §96.222, and §96.322 (as applicable) in accordance with the deadlines specified in §96.121, §96.221, and §96.321 (as applicable); and

(ii) Submit in a timely manner any supplemental information that the permitting authority determines is necessary in order to review a CAIR permit application and issue or deny a CAIR permit.

(2) The owners and operators of each CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) required to have a title V operating permit and each CAIR NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable) required to have a title V operating permit at the source shall have a CAIR permit issued by the permitting authority under subpart CC, CCC, and CCCC (as applicable) of 40 CFR part 96 for the source and operate the source and the unit in compliance with such CAIR permit.

(3) Except as provided in subpart II, III, and IIII (as applicable) of 40 CFR part 96, the owners and operators of a CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) that is not otherwise required to have a title V operating permit and each CAIR NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable) that is not otherwise required to have a title V operating permit are not required to submit a CAIR permit application, and to have a CAIR permit, under subpart CC, CCC, and CCCC (as applicable) of 40 CFR part 96 for such CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) and such CAIR NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable).

STEP 3, continued

(b) Monitoring, reporting, and recordkeeping requirements.

(1) The owners and operators, and the CAIR designated representative, of each CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) and each CAIR NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable) at the source shall comply with the monitoring, reporting, and recordkeeping requirements of subparts HH, HHH, and HHHH (as applicable) of 40 CFR part 96.

(2) The emissions measurements recorded and reported in accordance with subparts HH, HHH, and HHHH (as applicable) of 40 CFR part 96 shall be used to determine compliance by each CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) with the CAIR NO_X emissions limitation, CAIR SO_2 emissions limitation, and CAIR NO_X Ozone Season emissions limitation (as applicable) under paragraph (c) of §96.106, §96.206, and §96.306 (as applicable).

(c) Nitrogen oxides emissions requirements.

(1) As of the allowance transfer deadline for a control period, the owners and operators of each CAIR NO_X source and each CAIR NO_X unit at the source shall hold, in the source's compliance account, CAIR NO_X allowances available for compliance deductions for the control period under §96.154(a) in an amount not less than the tons of total nitrogen oxides emissions for the control period from all CAIR NO_X units at the source, as determined in accordance with subpart HH of 40 CFR part 96.

(2) A CAIR NO_X unit shall be subject to the requirements under paragraph (c)(1) of §96.106 for the control period starting on the later of January 1, 2009 or the deadline for meeting the unit's monitor certification requirements under §96.170(b)(1), (2), or (5) and for each control period thereafter.

(3) A CAIR NO_X allowance shall not be deducted, for compliance with the requirements under paragraph (c)(1) of §96.106, for a control period in a calendar year before the year for which the CAIR NO_X allowance was allocated.

(4) CAIR NO_X allowances shall be held in, deducted from, or transferred into or among CAIR NO_X Allowance Tracking System accounts in accordance with subparts FF, GG, and II of 40 CFR part 96.

(5) A CAIR NO_X allowance is a limited authorization to emit one ton of nitrogen oxides in accordance with the CAIR NO_X Annual Trading Program. No provision of the CAIR NO_X Annual Trading Program, the CAIR permit application, the CAIR permit, or an exemption under §96.105 and no provision of law shall be construed to limit the authority of the State or the United States to terminate or limit such authorization.

(6) A CAIR NO_X allowance does not constitute a property right.

(7) Upon recordation by the Administrator under subpart EE, FF, GG, or II of 40 CFR part 96, every allocation, transfer, or deduction of a CAIR NO_X allowance to or from a CAIR NO_X source's compliance account is incorporated automatically in any CAIR permit of the source that includes the CAIR NO_X unit.

Sulfur dioxide emission requirements.

(1) As of the allowance transfer deadline for a control period, the owners and operators of each CAIR SO_2 source and each CAIR SO_2 unit at the source shall hold, in the source's compliance account, a tonnage equivalent of CAIR SO_2 allowances available for compliance deductions for the control period under §96.254(a) and (b) not less than the tons of total sulfur dioxide emissions for the control period from all CAIR SO_2 units at the source, as determined in accordance with subpart HHH of 40 CFR part 96.

(2) A CAIR SO_2 unit shall be subject to the requirements under paragraph (c)(1) of §96.206 for the control period starting on the later of January 1, 2010 or the deadline for meeting the unit's monitor certification requirements under §96.270(b)(1), (2), or (5) and for each control period thereafter.

(3) A CAIR SO_2 allowance shall not be deducted, for compliance with the requirements under paragraph (c)(1) of §96.206, for a control period in a calendar year before the year for which the CAIR SO_2 allowance was allocated.

(4) CAIR SO_2 allowances shall be held in, deducted from, or transferred into or among CAIR SO_2 Allowance Tracking System accounts in accordance with subparts FFF, GGG, and III of 40 CFR part 96.

(5) A CAIR SO_2 allowance is a limited authorization to emit sulfur dioxide in accordance with the CAIR SO_2 Trading Program. No provision of the CAIR SO_2 Trading Program, the CAIR permit application, the CAIR permit, or an exemption under §96.205 and no provision of law shall be construed to limit the authority of the State or the United States to terminate or limit such authorization.

(6) A CAIR SO_2 allowance does not constitute a property right.

(7) Upon recordation by the Administrator under subpart FFF, GGG, or III of 40 CFR part 96, every allocation, transfer, or deduction of a CAIR SO_2 allowance to or from a CAIR SO_2 source's compliance account is incorporated automatically in any CAIR permit of the source that includes the CAIR SO_2 unit.

Nitrogen oxides ozone season emissions requirements.

(1) As of the allowance transfer deadline for a control period, the owners and operators of each CAIR NO_X Ozone Season source and each CAIR NO_X Ozone Season unit at the source shall hold, in the source's compliance account, CAIR NO_X Ozone Season allowances available for compliance deductions for the control period under §96.354(a) in an amount not less than the tons of total nitrogen oxides emissions for the control period from all CAIR NO_X Ozone Season units at the source, as determined in accordance with subpart HHHH of 40 CFR part 96.

(2) A CAIR NO_X Ozone Season unit shall be subject to the requirements under paragraph (c)(1) of §96.306 for the control period starting on the later of May 1, 2009 or the deadline for meeting the unit's monitor certification requirements under §96.370(b)(1), (2), (3) or (7) and for each control period thereafter.

(3) A CAIR NO_X Ozone Season allowance shall not be deducted, for compliance with the requirements under paragraph (c)(1) of §96.306, for a control period in a calendar year before the year for which the CAIR NO_X Ozone Season allowance was allocated.

(4) CAIR NO_X Ozone Season allowances shall be held in, deducted from, or transferred into or among CAIR NO_X Ozone Season Allowance Tracking System accounts in accordance with subparts FFFF, GGGG, and IIII of 40 CFR part 96.

(5) A CAIR NO_X allowance is a limited authorization to emit one ton of nitrogen oxides in accordance with the CAIR NO_X Ozone Season Trading Program. No provision of the CAIR NO_X Ozone Season Trading Program, the CAIR permit application, the CAIR permit, or an exemption under §96.305 and no provision of law shall be construed to limit the authority of the State or the United States to terminate or limit such authorization.

(6) A CAIR NO_X allowance does not constitute a property right.

(7) Upon recordation by the Administrator under subpart EEEE, FFFF, GGGG, or IIII of 40 CFR part 96, every allocation, transfer, or deduction of a CAIR NO_X Ozone Season allowance to or from a CAIR NO_X Ozone Season source's compliance account is incorporated automatically in any CAIR permit of the source.

STEP 3, continued

(d) Excess emissions requirements.
If a CAIR NO_X source emits nitrogen oxides during any control period in excess of the CAIR NO_X emissions limitation, then:
(1) The owners and operators of the source and each CAIR NO_X unit at the source shall surrender the CAIR NO_X allowances required for deduction under §96.154(d)(1) and pay any fine, penalty, or assessment or comply with any other remedy imposed, for the same violations, under the Clean Air Act or applicable State law; and
(2) Each ton of such excess emissions and each day of such control period shall constitute a separate violation of this subpart, the Clean Air Act, and applicable State law.

If a CAIR SO_2 source emits sulfur dioxide during any control period in excess of the CAIR SO_2 emissions limitation, then:
(1) The owners and operators of the source and each CAIR SO_2 unit at the source shall surrender the CAIR SO_2 allowances required for deduction under §96.254(d)(1) and pay any fine, penalty, or assessment or comply with any other remedy imposed, for the same violations, under the Clean Air Act or applicable State law; and
(2) Each ton of such excess emissions and each day of such control period shall constitute a separate violation of this subpart, the Clean Air Act, and applicable State law.

If a CAIR NO_X Ozone Season source emits nitrogen oxides during any control period in excess of the CAIR NO_X Ozone Season emissions limitation, then:
(1) The owners and operators of the source and each CAIR NO_X Ozone Season unit at the source shall surrender the CAIR NO_X Ozone Season allowances required for deduction under §96.354(d)(1) and pay any fine, penalty, or assessment or comply with any other remedy imposed, for the same violations, under the Clean Air Act or applicable State law; and
(2) Each ton of such excess emissions and each day of such control period shall constitute a separate violation of this subpart, the Clean Air Act, and applicable State law.

(e) Recordkeeping and Reporting Requirements.
(1) Unless otherwise provided, the owners and operators of the CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) and each CAIR NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable) at the source shall keep on site at the source each of the following documents for a period of 5 years from the date the document is created. This period may be extended for cause, at any time before the end of 5 years, in writing by the permitting authority or the Administrator.
(i) The certificate of representation under §96.113, §96.213, and §96.313 (as applicable) for the CAIR designated representative for the source and each CAIR NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable) at the source and all documents that demonstrate the truth of the statements in the certificate of representation; provided that the certificate and documents shall be retained on site at the source beyond such 5-year period until such documents are superseded because of the submission of a new certificate of representation under §96.113, §96.213, and §96.313 (as applicable) changing the CAIR designated representative.
(ii) All emissions monitoring information, in accordance with subparts HH, HHH, and HHHH (as applicable) of 40 CFR part 96, provided that to the extent that subparts HH, HHH, and HHHH (as applicable) of 40 CFR part 96 provides for a 3-year period for recordkeeping, the 3-year period shall apply.
(iii) Copies of all reports, compliance certifications, and other submissions and all records made or required under the CAIR NO_X Annual Trading Program, CAIR SO_2 Trading Program, and CAIR NO_X Ozone Season Trading Program (as applicable).
(iv) Copies of all documents used to complete a CAIR permit application and any other submission under the CAIR NO_X Annual Trading Program, CAIR SO_2 Trading Program, and CAIR NO_X Ozone Season Trading Program (as applicable) or to demonstrate compliance with the requirements of the CAIR NO_X Annual Trading Program, CAIR SO_2 Trading Program, and CAIR NO_X Ozone Season Trading Program (as applicable).
(2) The CAIR designated representative of a CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) and each CAIR NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable) at the source shall submit the reports required under the CAIR NO_X Annual Trading Program, CAIR SO_2 Trading Program, and CAIR NO_X Ozone Season Trading Program (as applicable) including those under subparts HH, HHH, and HHHH (as applicable) of 40 CFR part 96.

(f) Liability.
(1) Each CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) and each NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable) shall meet the requirements of the CAIR NO_X Annual Trading Program, CAIR SO_2 Trading Program, and CAIR NO_X Ozone Season Trading Program (as applicable).
(2) Any provision of the CAIR NO_X Annual Trading Program, CAIR SO_2 Trading Program, and CAIR NO_X Ozone Season Trading Program (as applicable) that applies to a CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) or the CAIR designated representative of a CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) shall also apply to the owners and operators of such source and of the CAIR NO_X units, CAIR SO_2 units, and CAIR NO_X Ozone Season units (as applicable) at the source.
(3) Any provision of the CAIR NO_X Annual Trading Program, CAIR SO_2 Trading Program, and CAIR NO_X Ozone Season Trading Program (as applicable) that applies to a CAIR NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable) or the CAIR designated representative of a CAIR NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable) shall also apply to the owners and operators of such unit.

Hammond Plant Name (from Step 1)	

STEP 3, continued

(g) Effect on Other Authorities.
No provision of the CAIR NO_X Annual Trading Program, CAIR SO_2 Trading Program, and CAIR NO_X Ozone Season Trading Program (as applicable), a CAIR permit application, a CAIR permit, or an exemption under § 96.105, §96.205, and §96.305 (as applicable) shall be construed as exempting or excluding the owners and operators, and the CAIR designated representative, of a CAIR NO_X source, CAIR SO_2 source, and CAIR NO_X Ozone Season source (as applicable) or CAIR NO_X unit, CAIR SO_2 unit, and CAIR NO_X Ozone Season unit (as applicable) from compliance with any other provision of the applicable, approved State implementation plan, a federally enforceable permit, or the Clean Air Act.

Certification

I am authorized to make this submission on behalf of the owners and operators of the source or units for which the submission is made. I certify under penalty of law that I have personally examined, and am familiar with, the statements and information submitted in this document and all its attachments. Based on my inquiry of those individuals with primary responsibility for obtaining the information, I certify that the statements and information are to the best of my knowledge and belief true, accurate, and complete. I am aware that there are significant penalties for submitting false statements and information or omitting required statements and information, including the possibility of fine or imprisonment.

Charles H. Huling Name	
Signature Charles H. Huling	12/12/2008 Date

RECEIVED

DEC 18 2008

AIR PROTECTION BRANCH

Re: Comment on (2022-021-SIP-NR)

To Whom it may concern,

I urge TCEQ to implement the most stringent possible plan to bring Dallas back into attainment for ozone pollution in accordance with the National Ambient Air Quality Standards established by the Clean Air Act.

In their 2022 “State of the Air” report, the American Lung Association ranked Dallas as the 16th most ozone polluted city in the nation, and explained that these emissions can cause premature death and other serious health effects such as asthma attacks, cardiovascular damage, and developmental and reproductive harm.1 This is worse than their 2021 ranking in the report as they were 17th that year. I am concerned about the impacts that this pollution has on my community. According to analysis by researchers at New York University and the American Thoracic Society, elevated ozone levels in the Dallas-Fort Worth-Arlington area cause about 128 premature deaths, every year.2

A large part of the nonattainment problem in Dallas is related to the pollutants emitted from coal plants like the Martin Lake and Limestone plants. According to Sierra Club’s 2023 Out of Control report, the Martin Lake and Limestone coal plants cause an estimated 183 deaths every year.3 I urge you to address this pollution in your plan, and require Martin Lake and Limestone to utilize already-available control technology to reduce the amount of ozone pollution the plant is putting into the air.

Additionally, a serious concern that I have regarding TCEQs plan pertains to tailpipe testing fraud and TCEQ’s vehicle I/M program. There have been reports that fraudulent inspectors can use a simulator device similar to a flash drive that plugs into the emissions analyzer instead of the car. The device simulates a car's onboard diagnostic system and can be programmed to guarantee a passing result.4 Texas investigators believe millions of cars on Texas roads never passed state-required safety or emissions tests. Yet, those cars were able to get temporary paper license plates, or even regular metal plates, by paying an inspection station to fraudulently pass the car. Even more concerning is the fact that these reports found the state's inspection computer system is not programmed to catch fake inspections and immediately stop them.

I do not feel comfortable knowing that a state regulatory agency like TCEQ allows for such oversights that have a largely detrimental impact on the air quality and ozone pollution that we are exposed to in the DFW area. Thus, I ask that you all enforce the most strict plan to ensure that the city of Houston returns to an attainment status and greatly reduces its ozone pollution.

Thank you for your consideration,

Kim Sanders George
Desoto, Texas

Trevor Ellis
Flower Mound, Texas

Tracey Bonner
Arlington, Texas
“We ALL have a responsibility to work together in order to Protect and SAVE our Wilderness, Waterways and Environment from senseless Destruction and Poisoning in the name of Ignorance and Greed.”

Mark Bedgood
Corsicana, Texas

Nancy Hooten
Cedar Hill, Texas

Deann Darling
Arlignton, Texas

Jim Anderson
Garland, Texas

Michael Buescher
Lewisville, Texas

Patty Anderson
Livingston, Texas
“Please make sure that the air quality in Dallas, and all of Texas, is as high as possible. We are obligated to ensure that our children and grandchildren have a healthy environment.”

Sandra La Mont
Orange, Texas

Mark Goodman
Dallas, Texas
“Thanks for reading my letter and taking action.”

Jeffrey Ferrand
Dallas, Texas
“As Dallas residents that enjoy the outdoors, we feel strongly that using coal as a fuel is outdated and should be eliminated. There’s other options, including natural gas that, although nonrenewable, are much cleaner.”

Paul Christmas
Grand Prairie, Texas

Liz Wheelan
Dallas, Texas

Jason Cody
Garland, Texas

Carol Soph
Denton, Texas
“Anything the TCEQ can do to stop the burning of fossil fuels would help. Gas wells are a big contributor to the ground level ozone. We don’t have any time to waste in the race against global warming from fossil fuel use."

Robert Beverly
Orange, Texas
“I grew up in the deadly "cancer alley" of Orange, TX. Chemical/refineries all around and diesel spread on water to kill mosquitoes. False advertisement about the marshes surrounding the refineries and how clean they were. Chemical plants across the road.”

Steven Rosenberg
El Paso, Texas

Steven Rosenberg

Josh and Rom Tom Holding
Frisco, Texas
“Both of our daughters grew up with asthma, in large part due to pollution in the DFW area. High ozone days were and can continue to be traumatic events for our family. We should prioritize the health and safety of DFW’s population.”

Kathryn Melton
Deer Park, Texas

Melanie Gibson
Dallas, Texas

Amy Ardington
Bellville, Texas
“Clean air promotes citizens’ health, especially that of children.”

Martha Jenkins
Dallas, Texas
“My daughter and grandson both suffer from Asthma. The air in the Dallas area has a big impact on their (and every resident) quality of life. The technologies exist to help clean up our air, please require the pollution belching coal plants to clean up their pollution.”

Margaret Walden
Sachse, Texas

Laura Brownlee
Richardson, Texas

Mary Cato
Arlington, Texas

Cindy Spoon
San Antonio, Texas

Joan & Shane Goetz
Arlignton, Texas

Jennifer Yacio
Arlignton, Texas

Tara Lulla
Houston, Texas

Melanie Baldi
Italy, Texas

Stephen Lancaster
Denton, Texas
“Almost every day during these warmer months I experience sinus issues and start getting a headache around 2 or 3 in the afternoon due to the unsafe and unhealthy air quality in the DFW area. It makes it very hard to work and function normally.”

Roberta Beckman
Houston, Texas
“What happens in Dallas affects my grandchildren in Houston.”

Keith Stendebach
Mansfield, Texas

“Please implement the capture and pollutant minimization technologies that are available to keep DFW and surrounding areas clean.”

Travis Collins
Arlignton, Texas

Dallas Windham
Irving, Texas

Dory Dallugge
Lewisville, Texas

Pat Clemens
Dallas, Texas

Karishma Chatterjee
Arlington, Texas

Christie Parker
Pasadena, Texas
“Ozone pollution is hurting all of us and causing many debilitating health issues. It is the responsibility of the legislators who we have elected to make responsible decisions that will positively impact all of us. Do the right thing.”

Lynda Alvarez
Arlignton, Texas

Clara Boyer
Dallas, Texas
“As a citizen of Dallas, I have long been concerned about our air quality. This latest report documents our air pollution as getting progressively worse - quickly. Actions need to be taken to prevent this negative impact on our lives and our bodies.”

Lisa Macdonald
Garland, Texas

Re: Comment on (2022-022-SIP-NR)

To Whom it may concern,

I urge TCEQ to implement the most stringent possible plan to bring Houston back into attainment for ozone pollution in accordance with the National Ambient Air Quality Standards established by the Clean Air Act.

In their 2022 “State of the Air” report, the American Lung Association ranked Houston as the 8th most ozone polluted city in the nation, and explained that these emissions can cause premature death and other serious health effects such as asthma attacks, cardiovascular damage, and developmental and reproductive harm.1 I am concerned about the impacts that this pollution has on my community. According to analysis by researchers at New York University and the American Thoracic Society, elevated ozone levels in the Houston-The Woodlands-Sugar Land area cause about 116 premature deaths, every year.2

A large part of the nonattainment problem in Houston is related to the pollutants emitted from the W.A. Parish coal plant in nearby Richmond. According to a study from Rice University scientists, this power plant is responsible for an estimated 178 deaths per year.3 I urge you to address this pollution in your plan, and require W.A. Parish to utilize already-available control technology to reduce the amount of ozone pollution the plant is putting into the air.

Additionally, a serious concern that I have regarding TCEQs plan pertains to tailpipe testing fraud and TCEQ’s vehicle I/M program. There have been reports that fraudulent inspectors can use a simulator device similar to a flash drive that plugs into the emissions analyzer instead of the car. The device simulates a car's onboard diagnostic system and can be programmed to guarantee a passing result.4 Texas investigators believe millions of cars on Texas roads never passed state-required safety or emissions tests. Yet, those cars were able to get temporary paper license plates, or even regular metal plates, by paying an inspection station to fraudulently pass the car. Even more concerning is the fact that these reports found the state's inspection computer system is not programmed to catch fake inspections and immediately stop them. Please take action to reduce this pollution as well.

I do not feel comfortable knowing that a state regulatory agency like TCEQ allows for such oversights that have a largely detrimental impact on the air quality and ozone pollution that we are exposed to in the Houston area. Thus, I ask that you all enforce the most strict plan to ensure that the city of Houston returns to an attainment status and greatly reduces its ozone pollution.

Thank you for your consideration,

Whitney Cloud
Hawley, Texas
“I want our children to have clean air and water.”

Betty Baer
Houston, Texas
“Clean air matters, please help improve people’s health and the health of the planet.”

Zachary Caswell
Houston, Texas
“I want to be able to breathe and my children be able to do so as well. With the health impacts of carbon emissions, it’s important to start curbing them as soon as possible.”

Alan Bair
Austin, Texas
“I remember the issues with the air pollution while attending U of H in Houston a few years back. Please make the new rules such that these issues can be improved for the current residents of Houston and Texas in general.”

Frank Blake
Houston, Texas
“I have asthma and I am impacted by the many ozone alert days that occur in the Houston area.”

Robert Stark
Houston, Texas

Sally Jacques
Austin, Texas

Kate Kavanagh
Austin, Texas

Donald Gentz
Port Aransas, Texas

William Forbes
Nacogdoches, Texas

Leslie Frederick
Houston, Texas

Marce Walsh
Houston, Texas

Juliana Boswell
Austin, Texas

Rainbow Di Benedetto
Austin, Texas
“Please do the right thing for Texans.”

Karen Sterling
Cedar Creek, Texas
“The climate situation is now a CRISIS!”

Genie Mims
Houston, Texas
“Everyone deserves clean air to breathe.”

Mary Whitehead
Corpus Christi, Texas
“Every person deserves clean air to ensure good health. Good health would save Medicare/Medicaid money not to mention enhancing quality of life for everyone concerned. Our people deserve better. Mary W.”

Laura Long
Cedar Creek, Texas

David Mulcihy
Houston, Texas
“Ozone makes it hard for me to exercise outdoors.”

Sharon Gillespie
Austin, Texas

Katarina Schumann
Austin, Texas

Charlotte Goncarovs
Houston, Texas
“We need to do something about ozone pollution, yesterday. Every summer I get horrible high pressure, high ozone headaches. What are you going to do to protect us?”

Brant Kotch
Houston, Texas

Claudia Morgan
Austin, Texas

Bruce Keuneke
Richmond, Texas

Theresa Winemiller
Austin, Texas

Glenda Beasley
Austin, Texas
“I grew up across the road from refineries in La Porte, Texas and I'm pretty sure my lungs will never be the same. I thought the refineries were “making clouds” when I was little. Indeed they were! Today I live in Austin and can’t believe the smog I see around.”

Wallace Knight
Waco, Texas
“I am trying to find a place in Texas with air quality that won't cause me respiratory distress. I am looking to buy a home but areas like that in Houston are out, bad air quality and how many more areas can be automatically eliminated. No chance at all.”

Judy Landress
Ozona, Texas

Pamela Vangiessen
Houston, Texas

Marie Sophia Vassilakidis
Houston, Texas
“I am fed up with the air even in central Houston stinking like a swamp factory all the time, and I am sick of constant sinus issues (can't blame the heat or the pollen, I've been to other places with both but less pollution, and always feel better).”

Stephen Englander
Austin, Texas

Ivana Ivancic
Houston, Texas
“Some days there is just too much haze. Please make a decision that supports clean air and a clean environment for the citizens as well as nature. If there is available technology, industry needs to keep up because we should all be putting our health first.”

Shane O'Shea
Humble, Texas

Timothy Hissam

Pflugerville, Texas

Christine Liberatore
Pearland, Texas
“I live near Houston. My eyes tear when I am outdoors. My HEPA A/C filter can not filter my inside air enough. The air used to be clean. Some days are very difficult for two of my grandchildren with asthma.”

Deborah Harter
Houston, Texas
“I grew up in a family that valued the natural world above all else. It is a source of food and of beauty, of water and of the fossils that preserve the history of our planet.”

Harry Swinney
Austin, Texas
“I have breathing problems and ozone exacerbates the problem. The government should protect citizens by greatly reducing the allowed ozone levels, and the reduced limits should be strictly enforced.”

Martha Gorak
Katy, Texas

Delaina Foster
Houston, Texas
“Please stand up for Houstonians’ health and improve the air we breathe.”

Lisa Stone
Houston, Texas

Kristin Lewis
Stafford, Texas

Deanna M Pena
Houston, Texas

Sharon Cloninger
Austin, Texas

William Lindley
Houston, Texas
“I know personally so many people with conditions that impair breathing and not just those of my age. Something more can and must be done to alleviate this problem.”

Margaret Schulenberg
Round Rock, Texas
“Dumping one's trash on another's property is not accepted anywhere. Polluting is no different, and must not be accepted. Texas must accept the most stringent standards in order to protect our citizens and ensure that companies do not dump their waste onto others."

Robert Gilliland
Austin, Texas
“As an older Texan with emphysema I urge TCEQ to implement strong anti-pollution measures.”

Jim Mcdaniel
Austin, Texas
“It's past time to start putting people's health above corporate profits, especially when so many people are uninsured.”

Heidi Schmidt
Austin, Texas
“Please consider the air we are breathing… I myself struggle with asthma, which is exacerbated by air pollution. I worry for children (and everyone) growing up and living here in these areas. Please make choices to support the people that live and work here."

Chris Nicolosi
Houston, Texas
“From 2017 to 2018, illegal air pollution doubled, while enforcement actions by the TCEQ decreased. American citizens, children, grandchildren, and our wildlife have a right to a healthy environment. We don't deserve cancer now or later in life.”

Scott McHolland
Austin, Texas
“Everyone deserves clean water to drink and clean air to breathe. Especially our children and their children. Do not sacrifice clean air and water for the profit of a few to the detriment of the many. Thanks.”

Raul Rodriguez
Houston, Texas

Susan and Bryan Roberts
West Lake Hills, Texas

Virginia Himelright
Houston, Texas
“We are becoming seriously polluted cities! No reason. Please take steps to correct this.”

Mark and Brenda Steuer
Houston, Texas
“I strongly support efforts to reduce ozone pollution, as it is an issue very important to my family as we live in an urban area that suffers the brunt of air pollution from many industrial sites and highways. It is unconscionable that our government has not appropriately regulated the greatest sources of ozone pollution.”

Melanie Sinclair
Austin, Texas

Robert Bollinger
Austin, Texas

Edward W. Parken
Austin, Texas

David Sanderson
Nacogdoches, Texas
“Ozone travels north from Houston on the prevailing winds, and causes lung disease in the East Texas area. Please protect more than just Houstonites with strong regulation of the chemical industry there.”

Scott Swanson
Austin, Texas

Gilberto Lopez
Austin, Texas
“We know the solution, we need to execute.”

Jean Thomad
Houston, Texas

Elizabeth Schlein
Houston, Texas
“We need clean air to breathe.”

Sara Wood
Houston, Texas

Neil Mcqueen
Corpus Christi, Texas

Natalie Rochen
Austin, Texas
“As the summers here keep getting hotter and hotter, it has become more urgent than ever that my beloved state of Texas remains intact with breathable air for generations to come. In particular, my home city of Houston has struggled with ozone pollution.”

Anna K
Corpus Christi, Texas

Tara Lulla
Houston, Texas

Roberta Beckman
Houston, Texas
“"I have a 6 and a 2 year old granddaughter, who live in Houston, and I want them to be able to breathe healthy air and see the sky! I would hope other Houstonians would want their children and grandchildren to also. Our “state of the air” is horrific."

Winifred Hamilton
Houston, Texas

Denise Cantu
Corpus Christi, Texas
Amy Lagrone
Austin, Texas

Taylor Reed
Houston, Texas

James Klein
Corpus Christi, Texas

Eli McKay
Corpus Christi, Texas
“I demand TCEQ to implement the most stringent possible plan to bring Houston back into attainment for ozone pollution in accordance with the National Ambient Air Quality Standards established by the Clean Air Act.”

Brandt Mannchen
Houston, Texas
“It's time human life means something. We need protection for all from air pollution. Reduce air pollution as much as possible now!”

Clark Walker
VIctoria, Texas
“I speak not as a citizen of Houston Texas, but as a Texan who lives in a much smaller town in South Texas . Air quality in large cities is generally much worse than in the countryside, nevertheless, air quality everywhere is indirectly affected by bad air quality anywhere.”

Kellie Evilsizer
Austin, Texas

Ling Zhu
Austin, Texas

Tomas Rodriguez
Austin, Texas
“Think of your children and their children. What matters more to you?”

Craig Nazor
Austin, Texas
“It is time to finally reign in ozone pollution in Texas. For far too long, the various sources of ozone have been ignored; now the cumulative effects have become health and life threatening. It is time to make strong ozone standards across all ozone-polluting industries.”

Jason Richter
Houston, Texas

Jacklyn Alford
Austin, Texas

Charmine Hanna
Houston, Texas

John Weber
Corpus Christi, Texas

Lisa Brenskelle
Houston, Texas
“As a person who engages in frequent outdoor sports, such as running & cycling, the air quality in Houston matters to me very much. I am very concerned about the continuing poor air quality in Houston. It does not have to be this way, and should not.”

Cardin Tran
Houston, Texas

“Ever since I became a teenager 4 years ago, I have been under warnings left and right from the US weather service about the air in my community. Difficulty breathing is about a weekly occurrence for me, and I don't even go outside often.”

Claire Morris
Austin, Texas

Elinore & Louis Cumings
Rosenburg, Texas

Loyce Brown
Smithville, Texas
“Let us all imagine it is our own loved ones breathing the air - do what you know is right! Greed is not a good look on anyone.”

Kelly Westkaemper
Austin, Texas
“Being outside is immensely important to me and my well being - and yet living in Texas, I regularly get ozone warnings of unsafe AQI levels. I shouldn't have to sequester myself indoors day after day because of our inability to protect clean and safe air.”

Re: Comment on (2022-025-SIP-NR)

To whom it may concern,

I urge TCEQ to implement the most stringent possible plan to bring San Antonio back into attainment for ozone pollution in accordance with the National Ambient Air Quality Standards established by the Clean Air Act.

In their 2022 “State of the Air” report, the American Lung Association ranked San Antonio as the 25th most ozone polluted city in the nation, and explained that these emissions can cause premature death and other serious health effects such as asthma attacks, cardiovascular damage, and developmental and reproductive harm.1 I am concerned about the impacts that this pollution has on my community. According to analysis by researchers at New York University and the American Thoracic Society, elevated ozone levels in the San Antonio-New Braunfels area cause about 30 premature deaths every year.2

A large part of the nonattainment problem in San Antonio is related to the pollutants emitted from coal plants like the Spruce and San Miguel plants. According to Sierra Club’s 2023 Out of Control report, the Spruce and San Miguel coal plants cause an estimated 36 deaths every year.3 I urge you to address this pollution in your plan, and require both Spruce and San Miguel to utilize already-available control technology to reduce the amount of ozone pollution the plant is putting into the air.

Additionally, a serious concern that I have regarding TCEQs plan pertains to tailpipe testing fraud and TCEQ’s vehicle I/M program. There have been reports that fraudulent inspectors can use a simulator device similar to a flash drive that plugs into the emissions analyzer instead of the car. The device simulates a car's onboard diagnostic system and can be programmed to guarantee a passing result.4 Texas investigators believe millions of cars on Texas roads never passed state-required safety or emissions tests. Yet, those cars were able to get temporary paper license plates, or even regular metal plates, by paying an inspection station to fraudulently pass the car. Even more concerning is the fact that these reports found the state's inspection computer system is not programmed to catch fake inspections and immediately stop them.

I do not feel comfortable knowing that a state regulatory agency like TCEQ allows for such oversights that have a largely detrimental impact on the air quality and ozone pollution that we are exposed to in the San Antonio area. Thus, I ask that you all enforce the most strict plan to ensure that the city of Houston returns to an attainment status and greatly reduces its ozone pollution.

Thank you for your consideration,

Sandra Woodall
San Antonio, Texas
“ A human can live a maximum of 3 minutes without air. Clean air is the most important thing.”

Amber Abasacl
San Antonio, Texas

David Mcgowin
San Antonio, Texas
“Stop killing future generations. Ours and your children and grandchildren are depending on you to DO THE RIGHT THING!!!”

Christine Jacques
San Antonio, Texas

Juan Huerta
San Antonio, Texas

Penelope Speier
San Antonio, Texas

Deborah Martin
San Antonio, Texas

Diana Kalish
San Antonio, Texas
“As a resident, I want clean air to breathe. Let’s make this happen!”

Keri Neff
San Antonio, Texas
“As a person who suffered from respiratory issues, and seeing that San Antonio can implement better air quality controls but doesn’t, is infuriating. This is a public health issue that is urgent.”

Linda Hahus
San Antonio, Texas
“I am concerned about the pollution from these coal plants that is harming our San Antonio environment. I'm 82, and it's harmful to elders, but I'm really concerned about what this polluted air is doing to children. Greenlight the technology that can impact these pollutants.”

Madalynn Carey
San Antonio, Texas

David Kiddy
San Antonio, Texas

“Every morning commute is through a haze from the cement plants which combined with the moisture in the air makes for some very unhealthy breathing for young and old alike. Please take some strong action. Thank you.”

Katharine Sommerfield
San Antonio, Texas

Britt Coleman
San Antonio, Texas
“I am writing to express my concern about the ozone pollution in our city and its effects on the environment and human health. Ozone pollution is a serious problem that needs urgent attention and action from the authorities and the public.”

Hector Munoz
San Antonio, Texas
“Technology upgrades to newer standards, so the world needs to adapt to changes by guaranteeing cleaner lives for the future.”

Thomas Dukes
San Antonio, Texas
“Ozone pollution from the Spruce coal plant directly harms the health of San Antonian like me and my family.TCEQ has an obligation to fix it.”

Daniel D
San Antonio, Texas

Catherine Milbourn
San Antonio, Texas
“Please make a strong plan to reduce ozone pollution! My husband is asthmatic and the ozone affects him seriously. He does not even want to go out on ozone action days. Make a plan that more seriously limits ozone pollution and its release to safeguard his health.

Julia Rivett
San Antonio, Texas
“Quit adding so much cement everywhere and plant some trees.”

Fraces Lange
San Antonio, Texas
“Please set very high standards to control ozone Pollution.”

Nancy Fullerton
San Antonio, Texas

Destiny Agnew

San Antonio, Texas
“We Really need to CHANGE the way we live for the planet! Before it's Too LATE.”

Dana Spottswood
San Antonio, Texas
“Future generations will thank you!”

Danika Tolbert
San Antonio, Texas
“Ozone pollution must be curbed in order to preserve the environment and make whatever climate change mitigation we can for the sake of not only my children, but all children and those who are yet to be born.”