Texas' Ozone Success

Changing Standards Mask Texas' Air Quality Achievements

May 2010 | Kathleen Hartnett White
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"Establishing a new more stringent air quality standard for Ozone will significantly increase the number of ozone non-attainment areas nationwide and many counties within these areas will, for the first time, experience the stigma and compliance challenges of being Ozone Non-Attainment areas, including restrictions on growth, jobs and sustained economic development."

The National Conference of Black Mayors, Resolution of May 4, 2007.

Executive Summary

In January 2010, the United States Environmental Protection Agency (EPA) announced plans to change the ozone standard for the third time in the last six years. The agency's proposal of an ozone standard from 70 parts per billion (ppb) to 60 ppb would, if adopted, have widespread impacts across Texas and the nation. Among the 3,000 counties in the United States, 85 violate the current federal standard. Under an ozone standard as low as the EPA's proposed 60 ppb, that number would likely increase to 650 counties—every county with an ozone monitor.

To meet the new standard, the state must develop and submit an elaborate State Implementation Plan (SIP) to demonstrate attainment by the requisite date. Failure to develop an approvable SIP and to meet the standards at the attainment date can trigger multiple sanctions imposed on the state including loss of federal highway funds, federal regulatory controls, and a freeze of road construction.

Although the federal Clean Air Act (CAA) gives the EPA broad technical discretion to evaluate science and set standards, the weaknesses in the science behind the January 2010 proposal merit judicial review. To avoid litigation is a dangerous precedent, conceding unlimited scope to the EPA's regulatory jurisdiction.

Ozone non-attainment status shackles state authority and economic growth. The scientific justification of the EPA's actions must be thoroughly reviewed and legally challenged if necessary.

The CAA should be amended to set minimal criteria for scientific rigor and risk assessment. Cost-effectiveness analyses must be a factor in establishing the National Ambient Air Quality Standards (NAAQS). Equally important, the process for developing State Implementation Plans must be streamlined.

Introduction

America is a rare nation, prosperous enough to impose federal air quality standards protective of human health regardless of cost. However, the question remains, what ozone level provides adequate protection? The EPA can't quite decide where to set the federal ozone standard and so keeps raising the bar.[1] Many prominent scientists and medical doctors maintain that the standard currently in effect provides requisite protection of human health.

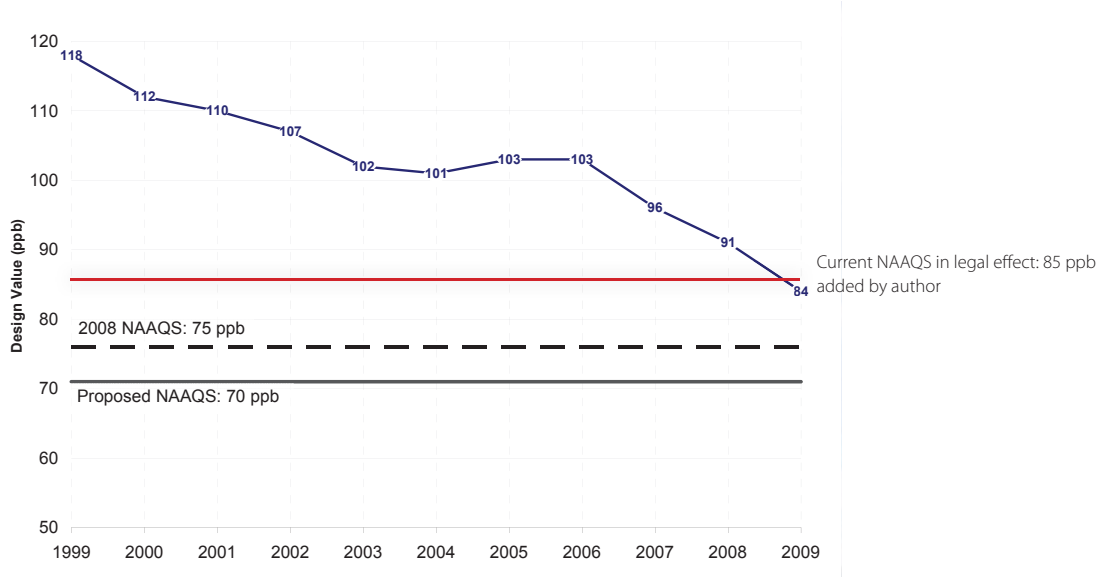
The federally binding ozone limit remains the eight-hour, 85 ppb standard. On the basis of 2009 monitored data, all but one Texas urban area now meet this standard. Texas has achieved an extraordinary improvement in air quality.

Ozone (O3), one of six federally regulated criteria pollutants, has long been the greatest air quality challenge in Texas urban areas. **(See Sidebar: What is Ozone?)** Ozone is a not a directly emitted pollutant but is the result of a photochemical reaction between oxides of nitrogen (NOx) and volatile organic compounds (VOCs). Tailpipe emissions and common industrial processes produce NOx and/or VOCs. At certain levels and exposures, ozone is a respiratory irritant for sensitive groups.

Texas, however, has improved ozone levels across the state. Against formidable odds, Texas has achieved a rare "win-win"—one for the environment and one for the economy. Over the last 10 years, while Texas has enjoyed record-setting economic growth, ozone levels have declined far more than in most other states. Over the same period, ever-green California has declined economically *and* lags far behind Texas in reducing ozone.

From 1998-2008, the Texas economic growth rate of 38.8 percent out-performed the U.S. overall rate of 28 percent. Over the same period, ozone levels in the Houston region decreased from 120 ppb in 1999 to 84 ppb in 2009. Houston met the operative federal ozone standard for the first time—an accomplishment few predicted. **(See Figure 1)** At the same time that Texans' incomes and numbers were increasing, Texas air quality was improving.

Figure 1: Eight-Hour Ozone Design Values for the Houston-Galveston-Brazoria (HGB) Area



Note: 2009 design values based on average of 2007 to 2009 data. Design values as of November 13, 2009 and are subject to change.
Source: TCEQ Emission Inventory, Air Quality Division, AMDA: 2010

Sidebar: What is Ozone?

Ozone is one of six criteria pollutants regulated by the EPA under the federal Clean Air Act (CAA). The criteria pollutants are ozone (O3), carbon monoxide (CO), sulfur dioxide (SO2), nitrogen dioxides (NO2), particulate matter (PM), and lead. The CAA directs the EPA to develop numeric National Ambient Air Quality Standards (NAAQS) for the criteria pollutants. The EPA must use the "latest scientific knowledge" to set the NAAQS at levels protective of public health (a primary standard) and welfare (secondary standard). Primary NAAQS are to protect the health of sensitive groups. Secondary NAAQS are to protect soils, water, vegetation, animals, visibility, etc. In establishing the primary NAAQS as exclusively health-based standards, the EPA cannot consider cost or practical viability. The EPA must review each NAAQS every five years to incorporate the latest science.

After setting the standard by final rule, the EPA designates those counties which fail to attain the standard. Counties are classified (e.g., moderate, serious, severe) by level of ozone exceeding the standard. The EPA imposes on each non-attainment area a date by which the NAAQS must be attained as measured at ozone monitors. Compliance with the attainment date is the legal responsibility of the state.

Under layers of the EPA strictures, the state must develop and submit an elaborate State Implementation Plan (SIP) to demonstrate attainment of the NAAQS by the requisite date. Failure to develop an approvable SIP and to meet the NAAQS at the attainment date can trigger multiple sanctions imposed on the state including loss of federal highway funds, federal regulatory controls, and freeze of road construction.

Ozone at certain levels can temporarily decrease lung function and aggravate pre-existing respiratory and cardiovascular infirmities like asthma and emphysema. Unlike other pollutants, ozone is not directly emitted. Ozone results from a photochemical reaction (light and heat) of nitrogen oxides (NOX) and volatile organic compounds (VOC)—byproducts of the combustion of fossil fuels. Combustion of transportation fuels (including ethanol) is now the major source of ozone-producing emissions (precursors). Ethanol produces slightly more NOX than petroleum based gasoline.

In 1997, the EPA adopted the eight-hour, 85 ppb ozone standard (equivalent to 0.080 parts per million with rounding). Legal attainment of the eight-hour, 85 ppb standard is based on a three-year average of each year's fourth highest daily maximum eight-hour average concentration. The EPA did not begin legal implementation of this standard until 2004. Until final adoption of the new standard the EPA proposed in January 2010, the 85 ppb standard remains in legal effect.★

The phenomenal Houston accomplishment, however, means much to air quality but nothing to the EPA. In January 2010, the EPA announced plans to change the ozone standard for the third time in the last six years. The agency's proposal of an ozone standard from 70 ppb to 60 ppb would, if adopted, have widespread impacts across Texas and the nation. Among the 3,000 counties in the U.S., 85 violate the current federal standard. Under an ozone standard as low as the EPA's proposed 60 ppb, that number would likely increase to 650 counties—every county with an ozone monitor.[2]

Ozone non-attainment status shackles state authority and economic growth. The scientific justification of the EPA's actions must be thoroughly reviewed and legally challenged if necessary.

Ozone Levels Dramatically Reduced Across Texas: 1999-2009

Consider the Houston-Galveston-Brazoria (HGB) region, home of the largest concentration of petrochemical industries in the nation and with an optimal climate for ozone formation. Ozone readily forms in the presence of heat and sunlight and, thus, is predominantly a summer phenomenon. The interaction of such factors in Houston as long hot summers, gulf wind trajectories, petrochemical industrial emissions, and a large population readily maximize ozone formation.

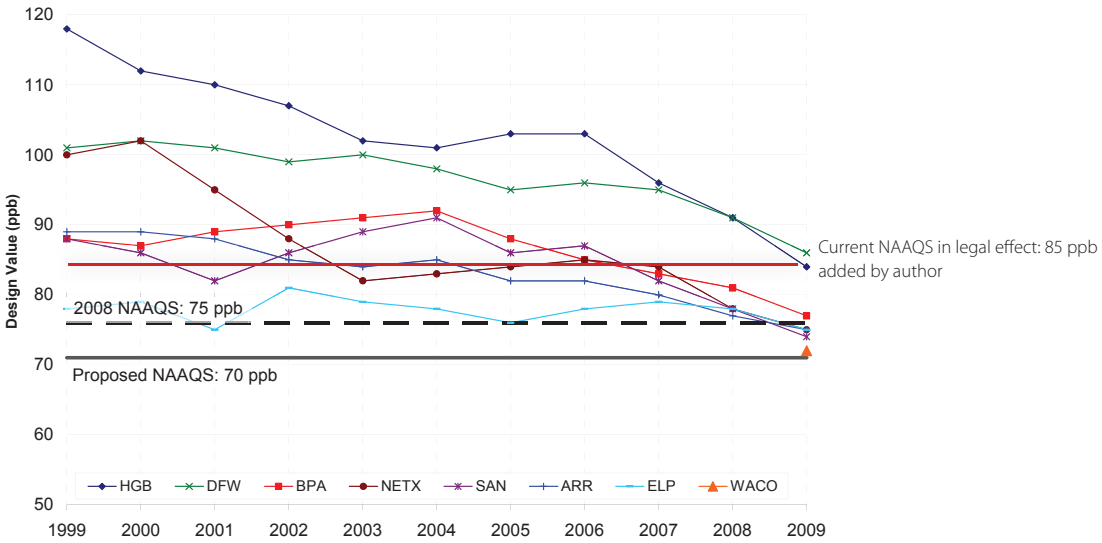
The magnitude of Houston's ozone-reducing accomplishment cannot be explained away by unusual weather and wind trajectories. For years, HGB vied with Los Angeles as the most ozone-polluted, i.e., dirtiest, city in the country. Complex and coordinated efforts, however, drove a dramatic improvement in Houston's air quality. With monitored ozone levels of 84 ppb in 2009, the HGB region attained the eight-hour, 85 ppb federal standard.

Over the last decade, Texas undertook a major effort to reduce ozone. Many elements worked together to produce this highly successful effort including: investment from industry and state and local governments; cutting-edge ozone science developed by the Texas Commission on Environmental Quality (TCEQ); multiple layers of stringent but creative TCEQ emission controls; and innovative technology and fine-tuned management. **(See Appendix: Texas Ozone Reduction Efforts)**

Although Houston's improvement is the most dramatic, ozone levels have steadily decreased across the state. In each of the seven Texas regions with a past exceedance of the standard, ozone levels have steadily declined. **(See Figure 2 and Table 1)** Indeed, all but one of the seven Texas regions with past ozone problems met the legally binding limit in 2009: an ozone design value under the eight-hour, 85 ppb standard.[3]

Although ozone in the Dallas-Fort Worth region (DFW) has decreased far more than in most Texas areas, DFW is still slightly above

Figure 2: Eight-Hour Ozone Design Values by MSA



Note: 2009 design values based on average of 2007 to 2009 data. Design values as of November 13, 2009 and are subject to change.
Source: TCEQ Emission Inventory, Air Quality Division, AMDA; 2010

Table 1: 2009 Ozone Design Values

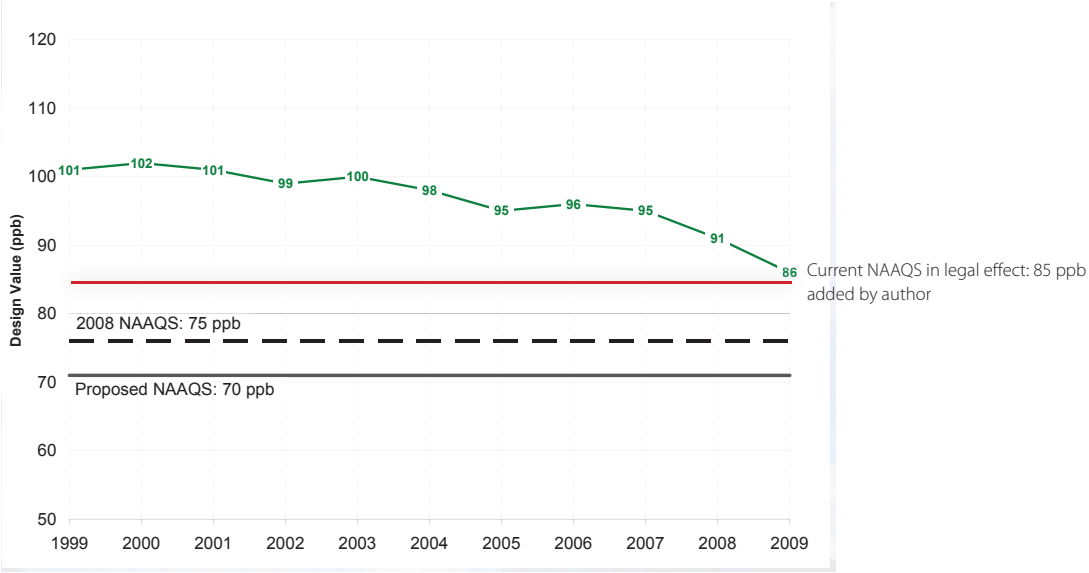
Region	2009 Ozone Design Values	Highest 8-Hour Ozone Monitored Level (1999-2009)
Houston-Galveston-Brazoria (HGB)	84 ppb	120 ppb
Dallas-Fort Worth (DFW)	86 ppb	101 ppb
Beaumont-Port Arthur (BPA)	77 ppb	92 ppb
Northeast Texas (NETX)	75 ppb	102 ppb
San Antonio (SAN)	74 ppb	91 ppb
Austin-Round Rock (ARR)	75 ppb	89 ppb
El Paso (ELP)	75 ppb	81 ppb

Source: TCEQ Emission Inventory

the standard, with a design value of 86 ppb in 2009. **(See Figure 3)** By lowering the ozone level from 96-86 ppb in less than four years, DFW remains an outstanding example of air quality improvement. The challenge for DFW is more intractable than other Texas areas. An area heavily dominated by mobile sources of ozone emissions and with relatively few major industrial sources, DFW has limited means of directly reducing the majority of ozone forming emissions.

The EPA distinguishes between stationary "point" source emissions (e.g., industrial facilities) and "mobile" source emissions (e.g., cars, trucks, and engines). Mobile sources include on-road tailpipe emissions from vehicles and off-road emissions from moveable equipment like cranes and bulldozers. Of critical importance, regulatory control of mobile sources is a federally preempt (i.e., exclusive) authority. The EPA regulates mobile sources largely through engine standards, tailpipe emission standards, and fuel specifications.

Figure 3: Eight-Hour Ozone Design Values for the Dallas-Fort Worth Area



Note: 2009 design values based on average of 2007 to 2009 data. Design values as of November 13, 2009 and are subject to change.
Source: TCEQ Emission Inventory, Air Quality Division, AMDA; 2010

Federal law gives Texas the authority to regulate emissions from stationary or "point" sources, but the federal government retains exclusive authority over mobile sources.

Federal law gives Texas the authority to regulate emissions from stationary or "point" sources, but the federal government retains exclusive authority over mobile sources. Although the state of Texas must comply with the ozone standard, the state does not have the legal authority to directly address the bulk of the problem. The engine and fuel standards are appropriately of national, not state, provenance. State-only "boutique" fuels, of which California is so fond, have limited environmental effectiveness and undermine market economics for refiners and automakers.

If a state cannot act to reduce emissions from the lion's share of the emissions creating ozone, the state is unlikely to attain a stricter standard in a short time frame. According to a 2008 TCEQ emissions inventory, 79 percent of NOx emissions in DFW derive from mobile sources; only 10 percent derive from point sources. However stringently the state might control those 10 percent of industrial emissions, the volume of reductions potentially realized falls short of the volume necessary for attainment of the ozone standards. How can Texas attain a stricter ozone standard when 79 percent of the problem is outside the state's authority?

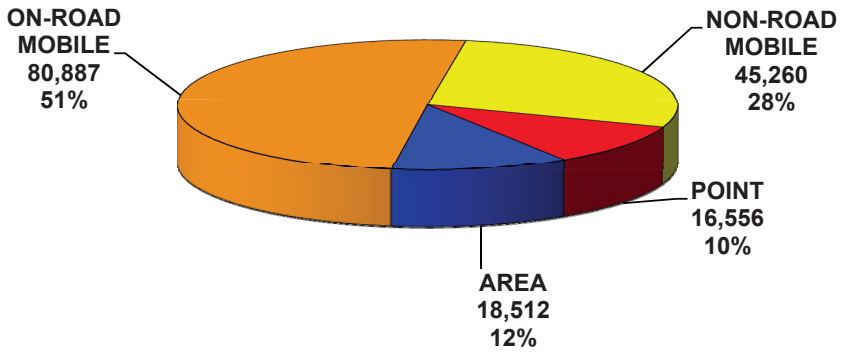
Even in HGB, with a far larger volume of industrial emissions than DFW, mobile sources now dominate at 72 percent of NOx emissions. Emissions from the massive industrial facilities in the Houston petrochemical complex already are so effectively controlled that industrial NOx emissions now comprise only 22 percent of regional NOx emissions. **(See Figures 4 & 5)**

However impossible, the state's attainment of the EPA standard is mandatory. If the state does not meet the federal limit by the prescribed date, the EPA can impose multiple sanctions including withdrawal of federal highway funds. To get around this legal impasse, the Texas Legislature, the TCEQ, and local governments throughout the nine-county DFW non-attainment region devised creative means to reduce mobile source emissions.

EPA had adopted cleaner engine standards but the effective dates were not aligned with key ozone attainment dates. Thus, TCEQ sought and received special exemptions from EPA to require Texas Low Emission Diesel (TXLED), a low-NOx fuel. By TCEQ rule, all diesel sold east of I-35 must meet the TXLED specifications. An expensive, complicated requirement for refiners, TXLED now provides limited, if any, emission benefits because a federal lower emission diesel is now in effect.

The Texas Legislature also established a fund to incentivize early replacement of diesel-burning engines. Through this Texas Emission Reduction Program (TERP), TCEQ has given grants in excess of $1 billion for retrofit or replacement of engines, construction equipment, and trucks. The TERP program grants originally motivated early purchase of the cleaner engines, not yet required by EPA's standards. For example, TERP grants of around $50 million went to railroads for replacement of switcher engines. The EPA has adopted requirements for these locomotive engines but the effective dates still remain in the future. The source of TERP funds is a surcharge of $15-$20 on new vehicular title fees. If the EPA had assumed its statutory responsibility to address mobile sources, e.g., through timely engine standards for locomotives, Texans could have kept this money.

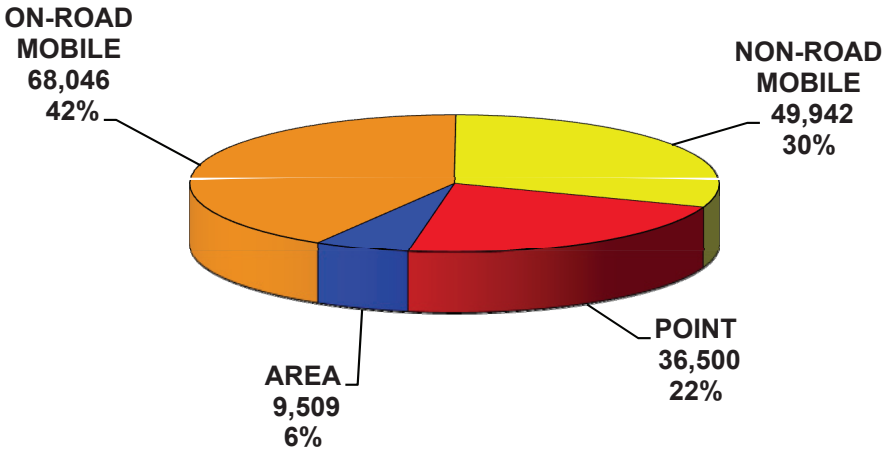
Figure 4: 2008 Dallas-Fort Worth NOx Emissions Inventory (tons per year)



Note: Biogenic emissions not included

Source: 2008 TCEQ Emission Inventory, Air Quality Division, AMDA: 2010

Figure 5: 2008 Houston-Galveston-Brazoria NOx Emissions Inventory (tons per year)



Note: Biogenic emissions not included

Source: 2008 TCEQ Emission Inventory, Air Quality Division, AMDA: 2010

Federal Ozone Standard: A Constantly Moving Target

Major reduction of ozone throughout Texas, unfortunately, is a fleeting achievement. In the last few years, the EPA has tightened the standard three times. For almost 25 years (1979-2004), the standard stayed the same. Since 2004, the EPA has promulgated three different standards: 85 ppb, 75 ppb, and now a proposed standard between 60-70 ppb.

Until the EPA finalizes the proposed standard and begins implementation by designation of non-attainment area, the eight-hour, 85 ppb standard sets the legal bar. Initially adopted by rule in 1997, the 85 ppb standard was not given legal force until 2004 with the designation and classification of non-attainment areas. The first attainment dates under the 85 ppb standard in Texas begin in 2010.

Welcome to SIP World—inefficient and arcane, long on convoluted process, short on results, and without flexibility.

Welcome to SIP World—inefficient and arcane, long on convoluted process, short on results, and without flexibility. In the summer of 2007, less than a month after Texas adopted the massive State Implementation Plans for compliance with the 85 ppb standard, the EPA formally proposed a lower 75 ppb standard. A wide range of credentialed scientists formally questioned the EPA's scientific justification for the change. In March 2008, however, the EPA adopted that 75 ppb standard. Now it wants to set the standard far lower. Under a White House directive to reconsider rule changes made by the Bush Administration, the EPA proposed in January 2010 an ozone standard within a 60-70 ppb range. Final adoption is expected in August 2010.

TCEQ's development of ozone SIPs is a herculean administrative and scientific task involving several years of preparation. A legally approvable SIP requires major state expenditures, complex photochemical modeling, reams of technical analyses, heaps of emission inventories, and adoption of multiple rules to impose enforceable control measures. Far from being a minor amendment to an existing SIP, a new ozone standard means starting all over again. Complex SIP control measures mean local governments and private businesses must scrap current SIPs and plan anew for regulations, expenditures, and technologies likely necessary under a stricter standard. In January 2010, less than one month after Texas ozone monitors showed attainment of the 85 ppb standard, the EPA changed the standard.

Consequences for Texas: EPA's Proposed New Ozone Standard 60-70 ppb

Among Texas urban areas, only DFW remains in non-attainment status measured under the current 85 ppb standard. Yet, only a few of the many ozone monitors in DFW recorded levels above the standard. Thus, air quality throughout most of the DFW region meets the standard. The gradual turnover of the vehicle fleet should bring DFW below the 85 ppb standard without any additional control measures. Exhaust from new cars emits up to 88 percent less NOx than cars manufactured in 2000.[4]

A federal ozone standard of 75 ppb or lower, however, would mean non-attainment status in *many* areas of Texas—as many as eight if the EPA changes the standard to 70 ppb, up to 12 if the standard is 60 ppb, the lowest figure on the EPA's proposed range. Astonishingly, these 12 areas would include Brewster county in Big Bend, one of the most sparsely populated counties in the

United States. A standard of 60 ppb approaches *natural* background ozone levels in parts of Texas. **(See Figure 6)**

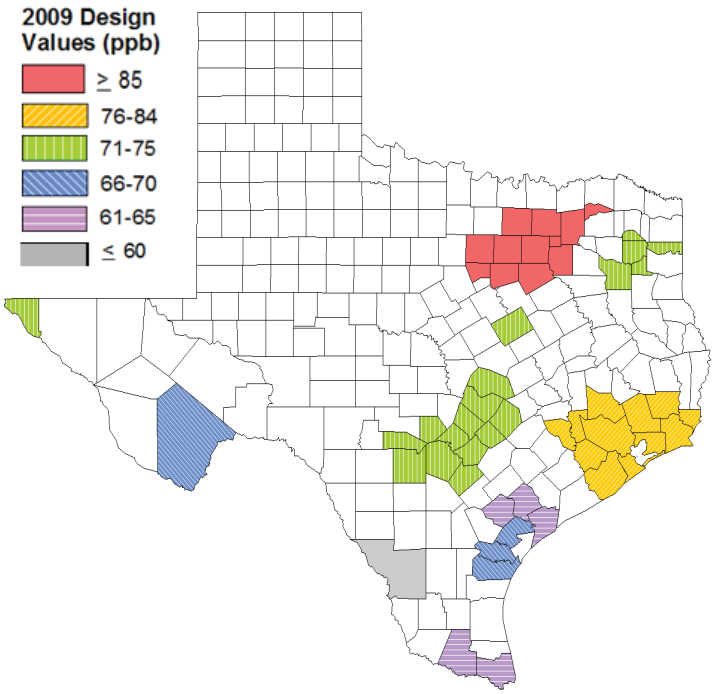
Under the still operative 85 ppb standard, the EPA tagged three Texas areas—HGB, DFW, and BPA—for non-attainment. Areas such as Austin and San Antonio were labeled Near Non-Attainment Areas, a status with relatively light regulatory implications. The EPA draws non-attainment boundaries with a broad brush, typically including entire Metropolitan Statistical Areas (MSAs) surrounding one or several core urban counties exceeding the standard. Thus, the DFW non-attainment area now comprises 12 counties around Dallas and Tarrant counties. These 12 may not have monitored violation of the standard but, when legally designated as non-attainment areas, all federal requirements apply.

Federal ozone non-attainment status has major consequences for the public and private sectors.

Federal ozone non-attainment status has major consequences for the public and private sectors. The administrative and technical requirements imposed on state and local governments create an ongoing and costly burden. The cost to private business is substantial, involving layers of regulation, emission control technology costing billions of dollars, and limits to growth. A federal non-attainment designation for a multi-county MSA like HGB or DFW immediately sets a ceiling on otherwise natural economic growth. The EPA's proposed stricter standard could lead to a non-attainment area beginning at the Texas-Oklahoma border above Dallas, extending through Austin to below San Antonio.

Figure 6: 2009 Primary Ozone Design Values by Metropolitan Statistical Area (MSA)

MSA	2009 8-Hr Ozone DV (ppb)*
DFW	86
HGB	84
BPA	77
TLM	75
ELP	75
AUS	75
SAN	74
WACO	72**
CC	69
Big Bend***	66
VIC	65
BRH	62
LAR	55



*Note: ** Waco Mazanec C1037 monitor will not have three complete years of data until April 2010.*
****Brewster county, where Big Bend is located, is not part of an MSA.*
Source: TCEQ Emission Inventory, Air Quality Division, AMDA; 2010

Non-attainment status requires "offsetting" emission reductions. Among multiple regulations, any new source of industrial emissions must come up with a volume of emission reductions equal to or greater than expected emissions from the new or expanded source. Offsets are usually purchased at a high price if they can be found. When industries plan to relocate or open a new plant, they typically avoid a site within a non-attainment area.

Emissions from industries in HGB, DFW, and BPA already are stringently regulated with state-of-the-art control technologies. **(See Appendix)** Consequently, most remaining ozone emissions are from mobile sources. Only two of the eight Texas areas likely destined for non-attainment status under the EPA's proposed standard have more industrial emissions (point sources) than mobile sources. **(See Table 2)**

Under a 75 ppb or lower standard, the state has few emission sources under its jurisdiction which could yield more meaningful reductions. Expensive controls on minor sources (e.g., boilers at schools and hospitals), although encouraged by the EPA, produce only minute reductions. "New" is, perforce, "cleaner." Purchase of new vehicles and cleaner-burning engines is by far the most effective, least costly means of reducing mobile emissions of ozone. Mobile source emissions will naturally decline as fleet turnover occurs, but the EPA, to date, will not coordinate attainment dates with engine standards or the projected timetable of fleet turnover.

The Quality of Science Matters

The EPA does not have sufficiently rigorous science to justify an ozone standard lower than 85 ppb. The EPA's previously adopted 75 ppb standard, like the proposed 70-60 ppb standard, relies on inconsistent, speculative, and largely epidemiological science. This body of science indicates vague correlations between adverse health effects and specific ozone levels. The EPA's 2008 and 2010 standard changes are not based on significant advancements in the relevant sciences. Federal regulatory decisions of the magnitude now proposed by the EPA should be supported by state-of-the-art science demonstrating a causal connection between ozone levels and health effects.

Table 2: Mobile Source Emissions Drive Ozone Formation

Texas Region	Mobile Source	Point Source
Houston-Galveston-Brazoria (HGB)	72%	22%
Dallas-Fort Worth (DFW)	79%	10%
San Antonio (SAN)	62%	33%
Austin (AUS)	76%	18%
El Paso (ELP)	72%	21%
Northeast Texas (NETX)	37%	29%
Corpus Christi (CC)	40%	44%
Beaumont-Port Arthur (BPA)	46%	49%

Source: TCEQ Emission Inventory

The CAA requires that the EPA periodically review the National Ambient Air Quality Standards (NAAQS), of which ozone is one. The EPA must reassess the ozone NAAQS every five years to assure that the numeric limit "accurately reflects the latest scientific knowledge useful in indicating the kind and extent of all identifiable effects on public health or welfare."[5] The EPA must set the ozone standards at a level "which in the judgment of the Administrator … and allowing for an adequate margin of safety are requisite to protect the public health."[6] But an ozone level needed to protect public health is not necessarily a level which avoids all risks or reduces ozone to non man-made background levels.[7]

Cost cannot be a factor. The U.S. Supreme Court has concluded that the economic costs of attaining the standard cannot be a balancing factor when establishing this exclusively health-based standard.[8] Only scientific data about effects on human health drive the EPA decision.

Many credentialed scientists and medical doctors publicly challenged the scientific basis for the EPA's 2008 change of the standard from 85 ppb to 75 ppb. This criticism would apply even more forcibly to the EPA's current proposal to set the standard far lower. The EPA's January 2010 proposal is not based on new scientific data but on a reinterpretation of existing science.

Dr. Roger McClellan, former chairman of the EPA's Clean Air Scientific Advisory Committee (CASAC), testified before Congress that the EPA's lowering of the standard from 85 ppb to 75 ppb "is a policy judgment based on a flawed and inaccurate presentation of the science that should inform policy decision."[9] A single new clinical study (measuring lung function in controlled exposure to ozone) found no statistically significant impact at ozone levels below the 85 ppb standard.[10] EPA staff reversed the author's conclusion with a methodology that the EPA typically rejects. A medical doctor and member of CASAC remarked that the EPA's reinterpretation of this clinical study "amounts to attempting to find effects in a very few individuals when the statistical effects are not significant … a very dangerous precedent … a pitiful number on which to attempt to base policy."[11]

When setting the national ozone standard, the EPA relies on epidemiological, toxicological, and clinical studies as well as various risk-assessment methodologies. The EPA's conclusion rests most heavily on the epidemiological studies. These studies can show weak correlations—but no demonstrated causation—between monitored ozone levels and adverse health impacts, including premature mortality. On closer review, many of the epidemiological studies are inconclusive or contradictory.

The largest study—looking at 95 U.S. cities over 14 years—found only six cities with a "statistical relationship" between ozone levels and premature mortality. Los Angeles, with the worst ozone problem, was not among the six.[12] A five-year California study found that children living in high ozone areas had a 30 percent lower incidence of asthma than children in low ozone areas.[13] Texas Inpatient Hospital Discharge data from 1999-2001 showed fewer hospital visits for asthma during the peak summer ozone season than during the winter low ozone season.[14]

The epidemiological studies on which the EPA so critically rests its decision have multiple scientific flaws. Of critical importance is the difference between actual and imputed exposure to ozone. The EPA-favored studies correlate health effects with monitored outdoor ozone levels rather than with personal (largely indoor) exposure.

Additionally, the EPA attributes any identified health effects (from hospital records versus patient histories) to the monitored ozone level. This approach does not consider potential effects from other pollutants (e.g., particulates and toxins) and assumes the ozone level caused the health impact.

Outdoor ozone levels at a monitor site are not an accurate measure of what the average individual breathes. And recall that high ozone levels are a summer problem. Personal indoor exposure is more likely about 10 percent of the outdoor monitored level.[15]

The problem of personal exposure was stressed by the CASAC in 2006. "It is known that personal exposure to ozone is not reflected adequately, and sometimes not at all, by ozone concentrations measured at central monitoring sites. … Therefore it seems unlikely that observed associations between short-term ozone concentrations and daily mortality are due solely to ozone itself."[16]

Dr. Michael Honeycutt, Ph.D., Chief of Toxicology at the TCEQ, summarized the weakness in the EPA's scientific justification for a new ozone standard. "What this means is that the epidemiological studies used by the EPA to set the health-based ozone standard are not scientifically rigorous enough to be used as the basis for this important policy decision. These studies are based on the supposition that people breathe outside air 8-24 hours each day while the scientific data clearly show this is not the case."[17]

The unrealistic level at which the EPA set the Policy Relevant Background (PRB) is another key factor. PRB is the "uncontrollable" ozone produced by natural processes and transport absent man-made emissions. Underestimation of background levels results in overestimation of risk. Because the EPA is setting a regulatory standard, the EPA purports to estimate health effects from ozone only from "controllable" ozone generated by man-made emissions.

The level above the PRB is supposed to be the ozone caused by human activity. When the EPA adopted the 75 ppb standard in 2008 and again in the 2010 proposal, the EPA lowered the PRB by as much as 60 percent, thus attributing a greater percentage of total ambient ozone to man-made emissions. For the 85 ppb standard, the EPA used monitored data to set a PRB of 40 ppb. Instead of monitored data, the EPA now uses a widely challenged global simulation model to set the PRB as low as 15 ppb.

By lowering the PRB level, the EPA increased the risk assessment of ozone levels and premature mortality by 50 percent to 100 percent. Again the EPA's own CASAC noted that the *EPA Final Ozone Staff Paper* did not justify such a low PRB.[18] A former CASAC member testified to Congress that EPA staff's low PRB results in "unrealistically high mathematical projections of mortality and morbidity from low concentrations of ozone with excess risks being inappropriately attributed to ozone from anthropogenic precursors."[19]

Conclusion

The EPA's scientific justification for establishing an ozone standard below 85 ppb is inadequate. A policy decision with repercussions this significant—federal non-attainment status in 666 U.S. counties, including remote Brewster County, Texas—should be based on more substantial science. Remote correlations between ozone levels and adverse health effects may provide useful information. Science used to impose a mandatory ozone standard as low as 70-60 ppb, however, should demonstrate a causal connection between higher ozone levels and health effects.

The EPA's January proposal confines the final standard to a point between 70 ppb at the highest and 60 ppb at the lowest. Although the CAA gives the EPA broad technical discretion to evaluate science and set standards, the weaknesses in the science behind the January 2010 proposal merit judicial review. To avoid litigation is a dangerous precedent, conceding unlimited scope to the EPA's regulatory jurisdiction.

Dr. Roger McClellan has advised the EPA on health-effect based air quality standards since the EPA was founded over 40 years ago. He served for four years as Chairman of the Clean Air Act Scientific Advisory Panel. His stark judgment of what he calls a "blatantly political process" behind the EPA's January 2010 proposal to dramatically lower the ozone standard is noteworthy.

> "In my experience, the actions of Administrator Jackson in developing the proposed ozone rule are without precedent and are not being proposed in accord with the legal requirements of the Clean Air Act (CAA) nor past EPA practices. … Administrator Jackson is proceeding in an arbitrary and capricious manner to develop a 'reconsideration' NAAQS that is without precedent in the four decade old history of the CAA. The CAA has no provisions for revising a NAAQS based on scientific information that is four years out of date. … The new scientific information is abundant and compelling. It may well be the basis … for a policy decision to revise the primary [ozone] standard to a level as high as 0.084 ppm."[20]

The CAA should be amended to set minimal criteria for scientific rigor and risk assessment. Cost-effectiveness analyses must be a factor in establishing the NAAQS. Equally important, the process for developing State Implementation Plans must be streamlined.

The EPA's proposed new ozone standard is one of several national issues raising critical questions about the role of science in public policy decisions.

As the National Research Council noted in 2004: "The SIP process now mandates extensive amounts of local, state, and federal agency time and resources in a legalistic, often frustrating proposal and review process, which focuses primarily on compliance and intermediate process steps. This process probably discourages innovation and experimentation at the state and local levels; overtaxes limited financial and human resources available to the nation's Air Quality Management System."[21]

The EPA's proposed new ozone standard is one of several national issues raising critical questions about the role of science in public policy decisions. The EPA's recent endangerment finding on greenhouse gases also brings the question to the forefront.[22] Science should guide and ground policy decisions. However, as the societal and economic stakes escalate, the quality of the science must be assessed by policymakers. ✯

Endnotes

[1] M. Fumento, "The Hole in the EPA's Ozone Claims,"*Forbes*, http://www.forbes.com/2010/01/26/environmental-protection-agency-ozone-science-opinions-contributors-michael-fumento.html.
[2] Ozone Air Quality Standards: EPA's Proposed January 2010 Revisions, Congressional Research Service Report to Congress (1 Feb. 2010) CRS, 7-5700, R41062, http://www.crs.gov.
[3] An Ozone design value is the legal ozone measure of compliance with the federal standard: a three year average of each year's fourth highest daily maximum 8-hour average concentration.
[4] Over the last 10 years, the EPA's engine standards for new cars- or exhaust emission standards-) have progressively tightened. From 1996-2000, standards for NOx emissions were 0.6 grams per mile (g/m). From 2000-2004, new cars had to meet a 0.3 g/m. Automobiles manufactured after 2004 have a standard of 0.07 g/m. This progression amounts to an 88% reduction in NOx emissions per mile when comparing a 2000 model year car to a 2010 model year car. See also http://www.epa.gov/otaq/cert/veh-cert/b00001.pdf.
[5] CAA 108 (a) (2).
[6] *Whitman v. American Trucking Associations*, ("ATA"), 531 U.S. 457, 466 (2001).
[7] *Lead Industries Association v. EPA*, 647 F .2d 1130, 1155 (D.C. Cir. 1980).
[8] Ibid.
[9] Testimony before Clean Air Subcommittee of the U.S. Senate's Environment and Public Works Committee (11 July 2007) Dr. Roger McClellan, former member of the Clean Air Act Advisory Committee. Advisor, Toxicology and Human Health Risk Analysis, Albuquerque, NM.
[10] W.C. Adams, "Comparison of Chamber 6.6 Hour Exposures to 0.04-0.08 ppm Ozone Via Square-Wave and Triangular Profiles on Pulmonary Response" *Inhalation Toxicology* 18, 127-136 (2006).
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[15] R. McClellan et al, "Critical Consideration in Evaluating Scientific Effects of Ambient Ozone: A Conference Report," Inhalation Toxicology 21, 52 (2009) 1-36.
[16] Testimony before Clean Air Subcommittee of the U.S. Senate's Environment and Public Works Committee (11 July 2007) Dr. Roger McClellan, former member of the Clean Air Act Advisory Committee. Advisor, Toxicology and Human Health Risk Analysis, Albuquerque, NM.
[17] Dr. Michael Honeycutt, Ph.D., Chief Toxicologist, TCEQ . From TCEQ Press Release (2 Feb. 2010) regarding oral testimony, EPA field Hearing on proposed ozone standard, Houston, TX.
[18] Dr. Allen S. Lofohn, Ph.D., "Major Issues Inadequately Addressed in the Final Version of the EPA's Ozone Staff Paper" (28 Feb. 2007) 6-8.
[19] *Lead Industries Association v. EPA*, 647 F .2d 1130, 1155 (D.C. Cir. 1980).
[20] Dr. Roger O. McClellan, Comments on the National Ambient Air Quality Standards for Ozone, Proposed Rule, Federal Register, Vol. 75, No.11 (19 Jan. 2010) 2938-3052.
[21] Air Quality Management in the United States, National Research Council of The National Academies, "Designing and Implementing Control Strategies Through the SIP Process" (2004) Chapter 3: 74.
[22] Petition for Reconsideration of Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act. Greg Abbot, Attorney General of Texas (16 Feb. 2010).

Appendix: Texas Ozone Reduction Efforts— Controls, Creativity, Science, Technology, and Cooperation

Through the Texas Commission on Environmental Quality (TCEQ), Texas has enacted among the most targeted, effective, and stringent regulatory controls to reduce ozone producing emissions from stationary (industrial) sources. Texas also has created some of the most creative and generous incentives to reduce mobile source emissions. The state has developed state-of-the-art ozone science to discover which factors specific to individual regions in Texas drive ozone formation. For example, ozone forms differently in the Houston region than in the Dallas-Fort Worth region. Use of cutting-edge technology—like remote sensing technology and infrared cameras—also played a key role in the state's successful effort. Years of cooperative interaction with industry, universities, local governments, and all stakeholders forged a team effort. Industry investments in cutting-edge control technology and in enhanced operational management were key to the Texas success.

See also "Texas Air Quality Success," http://www.tceq.state.tx.us/implementation/air/airsuccess/airsuccess.

Stationary Source Ozone Controls

Over the last 10 years, TCEQ has enacted more than 50 different regulatory controls to reduce ozone precursor emissions: oxides of nitrogen (NOx) and volatile organic compounds (VOCs). Major control strategies include:

- Mass NOx Emission Cap & Trade Program in the Houston-Galveston-Brazoria area. This program reduced NOx emissions from major industrial sources by 80 percent from 2002-06.
- A suite of rules for the Dallas-Fort Worth area for NOx reductions from kilns, power plants, industrial sites, and stationary engines.
- Enhanced monitoring of flares, cooling towers, and other sources of highly reactive VOCs.
- Annual and short-term limits on highly reactive VOCs in Harris County.

Air Quality Research

Texas has invested more money in air quality research over the last 10 years than any state in the country. State financial resources and in-kind contributions from national organizations and universities supported an almost $50 million scientific effort. Through two major field studies (Texas Air Quality Study 2000 and Texas Air Quality II), the state developed targeted control strategies.

About the Author

Kathleen Hartnett White joined the Texas Public Policy Foundation in January 2008. She is a Distinguished Senior Fellow-in-Residence and Director of the Armstrong Center for Energy & the Environment. Prior to joining the Foundation, White served a six-year term as Chairman and Commissioner of the Texas Commission on Environmental Quality (TCEQ). With regulatory jurisdiction over air quality, water quality, water rights & utilities, storage and disposal of waste, TCEQ's staff of 3000, annual budget of over $600 million and 16 regional offices make it the second largest environmental regulatory agency in the world after the U.S. Environmental Protection Agency.

Prior to Governor Rick Perry's appointment of White to the TCEQ in 2001, she served as then Governor George Bush appointee to the Texas Water Development Board where she sat until appointed to TCEQ. She also served on the Texas Economic Development Commission and the Environmental Flows Study Commission. A writer and consultant on environmental laws, free market natural resource policy, private property rights, and ranching history, White received her bachelor *cum laude* and master degrees from Stanford University where for three years she held the Elizabeth Wheeler Lyman Scholarship for an Outstanding Woman in the Humanities. She was also awarded a Danforth National Fellowship for doctoral work at Princeton University in Comparative Religion and there won the Jonathan Edwards Award for Academic Excellence. She also studied law under a Lineberry Foundation Fellowship at Tech University.

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