

**LEGISLATIVE HEARING ON S. 2995:
THE CLEAN AIR ACT AMENDMENTS OF 2010**

JOINT HEARING

BEFORE THE

SUBCOMMITTEE ON CLEAN AIR
AND NUCLEAR SAFETY

AND THE

COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

MARCH 4, 2010

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ONE HUNDRED ELEVENTH CONGRESS
SECOND SESSION

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LEGISLATIVE HEARING ON S. 2995: THE CLEAN AIR ACT AMENDMENTS OF 2010

THURSDAY, MARCH 4, 2010

U.S. SENATE,
COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS,
SUBCOMMITTEE ON CLEAN AIR AND NUCLEAR SAFETY,
Washington, DC.

The full Committee met, pursuant to notice, at 10:05 a.m. in room 406, Dirksen Senate Office Building, Hon. Thomas R. Carper (chairman of the Subcommittee) presiding.

Present: Senators Carper, Alexander, Voinovich, Cardin, and Udall.

OPENING STATEMENT OF HON. THOMAS R. CARPER, U.S. SENATOR FROM THE STATE OF DELAWARE

Senator CARPER. Senator Voinovich and Senator Alexander and I are pleased to welcome all of you today to this hearing. We thank our witnesses for their preparation, for taking time to join us, and for your willingness to respond to our questions.

As you know, today's hearing is focused on Clean Air Act Amendments of 2010. It is legislation that Senator Alexander and I have introduced with, I think, about a dozen other co-sponsors, a bipartisan group, legislation that reduces fossil fuel power plant emissions of nitrogen oxide, sulfur dioxide and mercury, and to alleviate air related health and environmental problems from ozone, acid rain, and mercury contamination.

Senators will have roughly 5 minutes for their opening statements, and I will then recognize each panel of witnesses, led off by Regina McCarthy from EPA. Each witness will have roughly 5 minutes to offer her or his statement to our Committee, and following each panel's statement we will have two rounds of questions.

I am going to start off with an opening statement, and we will see how close I can stay to 5 minutes.

I want to very much thank Senator Alexander for being my partner in this endeavor now for years. I want to thank Senator Klobuchar for working with us on S. 2995, the Clean Air Act Amendments of 2010, and Senator Gillibrand, a member of this Committee, for co-sponsoring our efforts along with, I believe, 10 other Members. We have tri-partisan support for our legislation, Democrats, Republicans and one Independent from Connecticut. We are very grateful for all of them. And I just want to thank our Chairman of the full Committee here, Chairman Boxer, for allowing us to hold this hearing today.

Almost 20 years have passed since Congress made significant revisions to the Clean Air Act. During that time, many polluters have kept polluting, albeit at a somewhat slower rate, but our Nation's emission standards just have not kept pace. While there has been some significant environmental progress along the way, clearly we can still do better. If the legislation we are discussing today is enacted, we will do better. Much better. Millions of Americans will breathe easier as a result.

Almost 8 years ago, when Senator Alexander and I began working together to clean up our Nation's air, we faced three monumental challenges. And even before he and I began working together, Senator Voinovich and I tried hard to work together during the first term of the Bush administration. If these were easy issues to resolve, we would have solved them a long time ago. It is not for lack of effort across the aisle.

The first challenge is that air pollution knows no State boundaries. Air pollution emitted by our oldest and dirtiest fossil fuel power plants does not just affect the State in which they are located. As you will hear here today, States like Delaware have implemented tough Clean Air laws only to find pollution still in our air. It comes over from other States. In fact, mid-Atlantic and northeastern States like Delaware, Maryland, New Jersey, Connecticut, New Hampshire, Vermont, Maine, Rhode Island and others are located at what I call the end of America's tailpipe because we receive a heavy dose of pollution from other States.

The second major challenge is that air pollution causes serious health effects nationally, effects such as asthma, cancer, brain damage, and in some cases even death.

According to the American Lung Association, some 6 out of 10 Americans are exposed to harmful air pollution every day. For those of you who cannot read the chart, public health is threatened overall in 6 of 10 Americans. About 186 million people live in areas where air pollution endangers their lives. Court challenges have delayed EPA action to reduce daily emissions and to protect Americans.

The third challenge that we face is that EPA has struggled to tighten emissions standards beyond the Clean Air Act Amendments of 1990. Over the past 10 years EPA has attempted to regulate harmful power plant emissions, but court challenges have delayed action. Delays in action mean lives lost.

Senators Alexander, Klobuchar, Gillibrand and I, along with a bipartisan—or rather tri-partisan group of Senators, believe we need legislative certainty to protect public health because too many lives are at stake. And that is why we introduced the Clean Air Act Amendments of 2010.

Our legislation provides an aggressive—but we think achievable—schedule for fossil fuel power plants to reduce harmful emissions. First, our bill calls for reducing utility mercury emissions by at least 90 percent by 2015. Second, our bill calls for reducing utility sulfur dioxide emissions by at least 80 percent by 2018. And third, our bill calls for reducing utility nitrogen oxide emissions by at least 50 percent by 2015.

Those are significant reductions that the EPA agrees will save more than 215,000 lives over a 15-year period. Two hundred-fifteen

thousand lives over a 15-year period saves more, we are told, more than \$2 trillion in healthcare costs. I am trying to think quickly what the cost of healthcare legislation that the House and the Senate have been considering is, but it is about \$850 billion over 10 years.

We are talking here potentially saving more than twice what is in the healthcare bill legislation, twice in healthcare savings. And the cost to families? About \$1.90 per month. About \$1.90 per month. For less than \$2 a month we can save three times the number of people who live in my hometown of Wilmington, Delaware.

Passage of our bill also provides a certainty of predictability that industry in America needs. I think we have one more. Do we have one more chart? Thank you, Stephanie.

Clean Air Act Amendments of 2010 will guarantee reductions in harmful SO_x, NO_x and mercury emissions, provide business certainty, something we have not had, and protect public health, all at once.

Certainty allows companies to find the most cost effective reductions. Certainty puts Americans to work building clean energy equipment to sell here and export around the world, equipment that is stamped Made in the U.S.A. Combine business certainty with certainty that we will be protecting public health and we have ourselves what I think is a win-win situation.

In closing, let me just say the time for delay and inaction needs to come to an end. We cannot wait for another 20 years to change our clean air laws and save lives and provide greater certainty to our business community. I look forward to working with all my colleagues on this Committee and off of this Committee, Democrat, Republican and a couple of those Independents as well, as we attempt to pass this legislation and move forward for the good of our country.

All right. Normally I would yield to Senator Inhofe, who I think is going to be joining us, but since he is not here, I am going to ask Senator Voinovich, with whom I have labored in these fields for years and others, to good effect, I might add. One of the great joys of serving here in the U.S. Senate, and before that as Governor, was working with George Voinovich.

We have before us, ladies and gentlemen, three recovering Governors, all of whom were Chairman of the National Governor's Association. We enjoy working together, and it is just one of the—this can be a frustrating job, as you might imagine, but one of the things that I love is working with George and working with Lamar.

George.

[The prepared statement of Senator Carper follows:]

STATEMENT OF HON. THOMAS R. CARPER,
U.S. SENATOR FROM THE STATE OF DELAWARE

I'd like to first thank Senators Alexander and Klobuchar for working with me on S. 2995, the Clean Air Act Amendments of 2010 and Senator Gillibrand for cosponsoring our efforts.

I'd also like to thank Chairman Boxer for holding this hearing.

Almost 20 years have passed since Congress made significant revisions to the Clean Air Act. During that time, many polluters have kept polluting—albeit at a somewhat slower rate—but our Nation's emissions standards simply have not kept pace. While there has been some significant environmental progress along the way, clearly we can do better.

If the legislation we are discussing today is enacted, we will do better. Much better. Millions of Americans will breathe easier as a result.

Eight years ago, when Senator Alexander and I began working together to clean up our Nation's air, we faced three monumental challenges. The first challenge is that air pollution knows no State boundaries. Air pollution emitted by our oldest and dirtiest fossil fuel power plants doesn't just affect the State in which they are located. As we will hear today, States like Delaware have implemented tough clean air laws only to find pollution still in the air from other States. In fact, mid-Atlantic and northeastern States like Delaware, Maryland, New Jersey, Connecticut, New Hampshire, Vermont, Maine, and Rhode Island are located at the end of what I call "America's tailpipe" because we receive a heavy dose of pollution from other States.

The second major challenge is that air pollution causes serious health effects nationally, effects such as asthma, cancer, brain damage, even death. According to the American Lung Association, 6 out of 10 Americans are exposed to harmful air pollution every day.

Think about that. A majority of Americans—more than 186 million people—live in areas where there is enough air pollution to endanger their lives or threaten their health.

The third challenge is that the EPA has struggled to tighten emission standards beyond the Clean Air Act Amendments of 1990. Over the past 10 years, the Environmental Protection Agency has attempted to regulate harmful power plant emissions, but court challenges have delayed action. Delays in action means lives lost.

Senators Alexander, Klobuchar, Gillibrand and I—along with a bipartisan group of Senators—believe we need legislative certainty to protect public health, because too many lives are at stake.

That is why we introduced the Clean Air Act Amendments of 2010. Our legislation provides an aggressive—yet achievable—schedule for fossil fuel power plants to reduce harmful emissions.

First, our bill calls for reducing utility mercury emissions by at least 90 percent by 2015. Second, our bill calls for reducing utility sulfur dioxide emissions by at least 80 percent by 2018. Third, our bill calls for reducing utility nitrogen oxide emissions by at least 50 percent by 2015. These are significant reductions that the EPA agrees will save more than 215,000 lives over a 15-year period.

But if saving lives isn't enough, our bill also saves more than \$2 trillion in health care costs over the next 15 years and will cost families less than \$2 a month. For less than \$2 a month, we can save three times the number of people who live in my hometown of Wilmington, Delaware.

Passage of our bill also provides the certainty and predictability that industry in America needs. Certainty allows companies to find the most cost effective reductions. Certainty puts Americans to work building clean energy equipment to sell here and export around the world, equipment that's stamped "Made in the U.S.A." Combine business certainty with certainty that we will be protecting public health, and we have ourselves a win-win situation.

The time for delay and inaction must end. We cannot wait another 20 years to change our clean air laws and save lives.

I look forward to working with my colleagues to pass the Clean Air Act Amendments of 2010 this year.

OPENING STATEMENT OF HON. GEORGE V. VOINOVICH, U.S. SENATOR FROM THE STATE OF OHIO

Senator VOINOVICH. Thank you very much. I think the former Governors have a little different perspective on things.

I am pleased that you and Lamar and the rest of the Members have gotten together on this legislation because I have, for a long time, sought a national policy that implements a comprehensive air quality strategy that helps attain our Nation's national ambient air standards so that we can achieve reductions in mercury from coal-fired plants and streamline the Clean Air Act requirements.

I think most of you, and particularly Senator Carper, remember that I was the lead sponsor of the Clear Skies Act, and when that legislation stalled, I was supportive of the Administration's strategy to implement their policy by rule. And while there were differences of opinion on how these rules should have been implemented and whether the reduction requirements went far enough,

they were generally supported by much of the regulated community affected States and environmental groups. It gave certainty.

The courts' decisions when vacating these rules left no comprehensive or cost effective policy to address NO_x compliance, untangle the complicated web of overlapping and redundant regulations affecting power plants, and bring about the public health benefits we had hoped to achieve. The current situation is precisely what I had feared and is why Senator Inhofe and I worked so hard to get the Clear Skies Act passed.

Indeed, properly coordinating the compliance obligations for SO₂, NO_x and mercury promotes efficiency and enables many companies to meet a substantial portion of mercury emission reduction obligations through the co-benefits achieved through SO₂ and NO_x control, that is, scrubbers and SCRs. For these reasons, a three-piece strategy continues to make sense, and I am appreciative of the Carper-Alexander effort.

For 11, 12, this is the 12th year that we have tried to do something about three Ps. Because the environmental groups wanted four Ps. I think you remember. We thought we had to take care of the Smokies, and we were going to take care of the Adirondacks, and they said no, we have to do four Ps. So, it is wonderful that we are now talking about three Ps.

I do have concerns regarding the proposal. The concerns relate both to provisions that are in the bill as well as provisions that I think should be included in it.

In regard to what is proposed, the level and the timing of the reductions are unprecedented and cannot be achieved without significant fuel switching and increases in electric rates. And I think that is something that we all ought to take into consideration, particularly with the economy that we have today and the fact that people are just not paying their electric bills anymore because they cannot afford to pay them.

For example, the bill implements new SO₂ and NO_x reduction requirements in 2012, less than 2 years from now. This leaves little time for planning, implementation or the installation of controlled equipment. For example, by 2015—less than 5 years from now—the bill requires a 74 percent reduction for SO₂ and a 53 percent reduction for NO_x.

Adding to these concerns, the bill eliminates a key cost control feature established in the 1990 Clean Air Act Amendments, the allocation of emission credits to effective sources in favor of a Government auction. Under a cap-and-trade system, emissions are controlled by the level of the cap, and in this context auctions merely drive up electricity rates with no benefit to the environment.

In regard to the bill's mercury provision, the bill requires a minimum of 90 percent reduction in emissions by 2015. However, it is far from clear that a 90 percent control requirement can be met on a consistent and reliable basis across all types and plant configurations. In fact, while DOE has concluded that field testing has brought certain mercury control technologies "to the point of commercial deployment readiness" it cautions that there are "many fundamental questions about the long-term consistency of mercury removal and reliability."

As told, industry projects this bill would force the early retirement of over 25 percent of the U.S. coal fleet with the difference being made up by natural gas. And I would like to submit for the record an analysis that has been done by Energy Ventures Analysis, Inc.

Absent from the bill are provisions we all seek, regulatory certainty. In fact, the bill actually increases uncertainty and undermines options for cost effective emission reductions. For example, for both NO_x and SO_x the bill gives EPA broad authority to tighten emission caps after 2021. This gives industry no ability to project future emissions reduction requirements for planning and implementation purposes.

And while the bill sets a minimum requirement for mercury reductions, no upper bound is established, again giving EPA broad authority to set limits that are out of Congress' reach and give industry little ability to forecast compliance requirements.

That being said, Mr. Chairman, I want you to know that I am pleased that our staffs have been working together, and perhaps we can work something out. And to the environmental groups there that have been involved in this for a long period of time, maybe you will not get exactly what you want, but we can get close to it, and maybe we can get certainty in this area that has been hanging out there forever, and ever, and ever, and ever. And I am going to work my you know what off to see if we cannot make that happen.

Thank you.

[The referenced analysis follows:]



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**ANALYSIS OF CARPER-ALEXANDER-COLLINS-KLOBUCHAR STAFF
WORKING DRAFT OF CLEAN PLANNING ACT OF 2009
DATED AUGUST 7, 2009**

October 2009

Objective:

This study examines the impacts of the August 7, 2009 draft proposal entitled Clean Air Planning Act of 2009 offered by Senators Carper, Alexander, Collins, and Klobuchar. This draft would amend the 1990 Clean air Act to significantly reduce future emissions caps of sulfur dioxide, nitrogen oxide and mercury for the power industry. Specifically, the draft proposal would:

- Adopt the Clean Air Interstate Rule for emissions caps through 2011
- Reduce the effective national annual SO₂ emissions cap to 3.5 million tons/year for 2012-2014 and to 1.5 million tons/year for 2015-2019. Further reductions in the cap after 2020 would be allowed to protect the public health and achieve ambient air quality standards.
- Establish two NO_x zones that would each have its own separate national annual NO_x allowance trading program starting in 2012. In aggregate the national NO_x emissions cap would be set at 1.79 million tons for the period 2012-2014 and 1.62 million tons for the period 2015-2019. Further reductions in the cap after 2020 would be allowed to protect the public health and achieve ambient air quality standards.
- Establish a mercury Maximum Achievable Control Technology (MACT) limit that would reduce power sector emissions by 90 percent.
- Transition from providing affected sources no cost allowance allocations to auctioning 100 percent of all allowances starting in 2012.

In July 2009, EPA issued an analysis of this proposal without the mercury provisions or future greenhouse gas regulation. This analysis had many shortcomings and problems. The analysis did not evaluate the impact of the mercury provisions given the uncertainty of EPA's final MACT mercury rule. Nor could the analysis incorporate any effects from future greenhouse gas regulation that is still awaiting final Congressional action. Our review of the July 2009 EPA study is provided in Appendix A.

Major Findings:

Many concerns outlined in our earlier review of the EPA study persist as well as uncovering some additional problems not identified in the EPA analysis. The major findings were:

- The SO₂ emissions cap of 1.5 million tons/year will effectively limit long term coal-fired generation to 1,725 TWh/year once the current bank of surplus allowances are consumed. This would represent a 13.5% decrease in future coal generation from 2008 levels (1,994 TWh) and a 28.1% decrease from projected baseline 2030 levels (2,400 TWh)¹. Since the EPA analysis was still consuming the surplus banked allowances in their shorter forecast period², EPA study did not address the long term market implications from the very tight emission cap.
- Given its much smaller starting NO_x allowance bank, the power industry has far less flexibility in complying with its annual NO_x emissions cap of 1.62 million tons/year. Faced with the choice of investing in retrofit controls on units with the shrinking coal generation

¹ To be consistent with the July 2009 EPA Analysis, EVA used a similar no carbon baseline for this comparison.

² EPA analysis period covered 2009-2025. At the end of the EPA forecast period, the power industry emissions remained above the 1.5 MMT SO₂ cap by still drawing down the surplus allowance bank. EPA estimated that the surplus allowance bank would be exhausted by 2028.

market future, many suppliers may elect the premature retirement of many smaller, older coal units in lieu of NOx control retrofits. Accelerated retirements could reach 85.06 GW by 2030. To meet their reserve margin obligations, utilities will invest \$76.6 billion in new replacement generating capacity- primarily gas combined cycle units.

- Natural gas demand from coal displacement may increase by 13 BCFD by 2030 (vs. baseline levels)—equivalent to 20.5 percent of total 2008 natural gas demand³. This increased demand will force gas industry to vastly expand its drilling capital investments and develop higher incremental cost reserves. These costs will also push natural gas market prices much higher. This higher consumption from the power industry alone is expected to increase Henry Hub gas prices (\$2009) by a minimum of \$1.53/MMBtu by 2015, \$1.88/MMBtu by 2020, \$2.20/MMBtu by 2025, and \$2.26/MMBtu by 2030. These market price increases will affect not only the power industry but also be passed onto all other major gas consumers (residential, commercial and industrial) as well.
- The natural gas demand increase will trigger the need for record breaking well drilling activity. There is a significant market risk that supply shortages could occur--not from having insufficient reserves-- but from the inability to expand drilling activity fast enough to meet demand. If the natural gas industry is unable to expand its production fast enough (or not reach the demand levels at all), US consumers would become dependent upon imported LNG and natural gas prices may escalate to equivalent oil based prices that may run as high as \$18/MMBtu (2009\$) during domestic supply shortage periods. The market price risk of oil based prices is significantly and materially increases under the proposed 3-P proposal.
- Having accumulated a bank of nearly 10 million SO2 allowances by 2012, the industry will be able to delay the effective date for reaching the 1.5 million ton cap. SO2 market prices should initially be set by rising marginal FGD retrofit costs for needed controls but will quickly shift to the marginal cost for the required coal generation displacement starting in 2014-15. Allowance values should rise rapidly to \$2,300/ton by 2012 and eventually reaching \$8,170 by 2020 and \$8,280 by 2030. SO2 allowance prices are expected to trigger accelerated unit retirement and will be directly linked to rising natural gas prices.
- The two NOx allowance market zones will be created by the draft proposal but each will act very differently. The Eastern zone (Zone 1) will require prices to increase to \$3,710/ton by 2013 to justify the needed retrofit NOx controls to meet the stricter annual emissions limit. After 2013, Zone 1 NOx values are expected to steadily decline as the forced retirements of smaller, older coal units reduce overall industry NOx emissions. Given the growing allowance surplus, NOx prices may decline to their SCR control variable costs—roughly \$200/ton (2009\$) by 2017.
- Having been exempted from the earlier Clean Air Interstate Rule and EPA Ozone SIP Call programs, the Western Zone 2 sources will be forced to retrofit more SCR controls that require higher allowance prices to cover their marginal costs⁴. Zone 2 NOx prices are expected to initially peak at \$6,680/ton in 2014 to justify needed retrofit SCR controls. After a following 4-year period of market price declines, NOx prices are expected to steadily

³ 2008 Natural gas consumption was 23.209 TCF of 63.586 BCFD

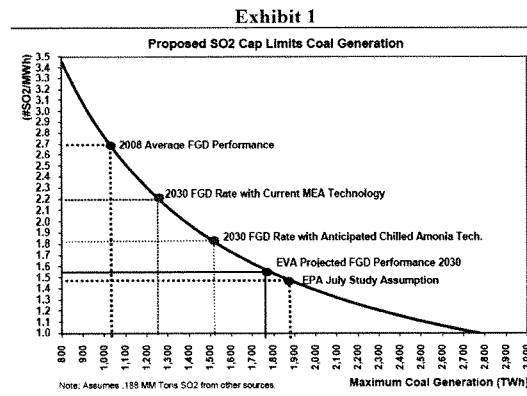
⁴ One major reason for the higher costs is that the initial baseline NOx emission level can be much lower for the PRB designed boilers. Therefore although the capital costs maybe the same, the amount of incremental NOx reductions are less and the cost per ton removed is higher.

increase for the remaining forecast period as generation growth requires justifying additional retrofit SCR control measures. Future technology improvements could reduce future NOx allowance price growth in the western zone 2 markets.

- The draft proposal would require at least a 90 percent mercury removal requirement for all coal fired generation by 2015. Given the current status of mercury control technology options, a significant technology risk exists to reach a 90 percent removal requirement for units burning sub-bituminous and lignite coals that account for 52 percent (541 million tons) of the 2008 power industry coal use. If no new technology improvements can be developed, the industry must either switch to alternative coals, trigger additional unit retirements or change the requirement (not allowed in current language).
- Shift from providing affected sources no cost allowances to 100 percent allowance auction will add market uncertainty and price risk to power industry compliance planning. The future markets will depend heavily upon companies willingness to make multi-billion environmental control investments given these allowance market uncertainties in combination with uncertainties of future regulation (e.g. HAP's, visibility, NAAQS changes).

Coal Generation Cap Created by Tight SO2 Emissions Cap:

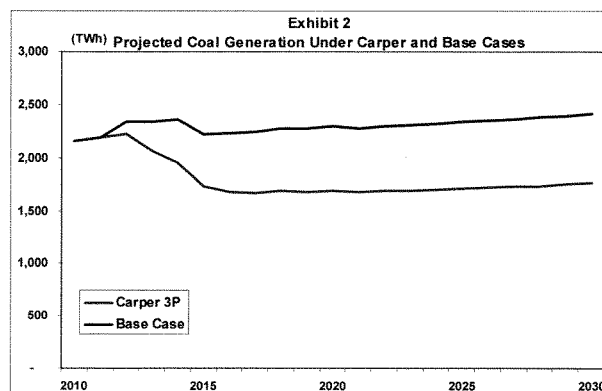
The draft proposal resets an annual emission SO2 cap at 3.5 million tons starting in 2012 and decreases to 1.5 million tons/year in 2015. This final emissions cap is very strict representing a near 80% reduction from actual 2008 levels (7.55 million tons) and will trigger an additional 70.7 GW of FGD retrofits at a capital cost of \$31.4 billion. While the existing banked allowance surplus can be used to delay the time when these emission caps must be reached⁵, they will eventually be consumed (2025-2030) and forced to comply with the 1.5 million tons/year limit. As is shown in Exhibit 1, this tight limit effectively limits long term coal-fired generation—the actual level depending primarily upon the average performance of FGD controls and to a much lesser extent on non coal SO2 emissions (e.g. distillate, resid, geothermal, other gas, etc.).



⁵ EVA projects that the SO2 allowance bank would reach 10 million tons in 2012 under the draft proposal rules.

A detailed assessment of FGD control performance and costs on all coal units was completed. This assessment found that 119 units (48 GW) could upgrade their existing FGD removal performance with a few modifications and reach 95% removal levels. These upgrades would reduce SO₂ emissions by roughly 460,000 TPY. All FGD retrofit candidates were assumed to reach 95% removal efficiencies on their lowest cost coal sources or a stricter level if the station had other scrubbed units operating at a better performance. From this detailed unit by unit assessment, the projected future FGD performance would improve from 2.7#SO₂/MWh⁶ in 2008 to 1.55 #SO₂/MWh. Given this FGD control performance in combination with the low projected emissions from remaining non-coal SO₂ emitting sources, coal generation must be less than 1,725 TWh/year to remain below the 1.5 million ton cap. This long term coal generation cap could be further reduced in the future with use of carbon capture technologies that will further degrade unit heat rate efficiency by 10-45 percent due to their high parasitic loads and increase the scrubbed SO₂ rate accordingly, or alternatively, if FGD performance levels do not improve as much as expected. Should increasing natural gas prices force units with dual fuel (oil and gas) capability to switch to higher oil mixes, the effective coal generation limit could be further reduced.

This 1,725 TWh long term coal generation cap represents a 13.5% decrease from 2008 levels (1,994 TWh) and a loss of 675 TWh by 2030 versus a no carbon coal generation baseline case (Exhibit 2). This forced coal generation displacement must be replaced with a combination of increased power supplies from other non-sulfur emitting sources (natural gas combined cycle, nuclear, renewables) and greater energy savings from expanded energy conservation programs.



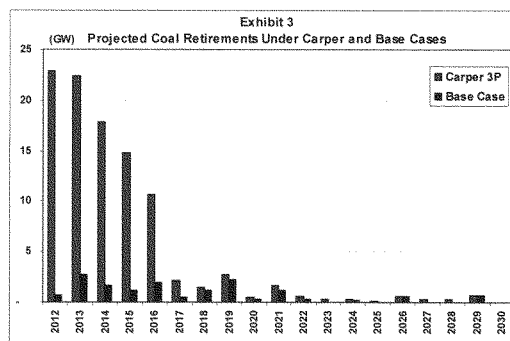
Accelerated Coal Retirements Triggered by Annual NO_x Cap and Poor Future Coal Generation Outlook:

The annual NO_x program will likely trigger an initial accelerated retirement of older coal-fired generating capacity. Having no sizable built up allowance bank as exists in the SO₂ market, many

⁶ According to the EPA 2008 CEMS data, the average emission rate for the coal fired units with FGD controls was 0.27#SO₂/MMBtu or roughly 2.7 #SO₂/MWh (@10,000 Btu/kwh heatrate). The July EPA analysis assumes a much improved FGD performance of 1.5 lbs SO₂/MWh which would support a longer-term higher coal generation level (1,994 TWh) at 2008 levels.

power suppliers will be forced to retrofit NOx controls before the 2012 and 2015 compliance deadlines or retire. Many power suppliers may be unwilling to invest in retrofitting environmental controls for initial NOx compliance for older, smaller units that have no long term future because of coal generation outlook outlined above and the market risks created by a 100 percent allowance auction format. These anticipated accelerated unit retirements should reach at least 85.06 GW--far greater than the 7 GW of coal-fired capacity projected by the July 2009 EPA Study (Exhibit 3).

Replacing this lost capacity will be expensive. The accelerated unit retirements will require a capital investment of \$76.6 billion in replacement new generating capacity investment and shift the market to a higher natural gas mix. The replacement capital investment costs will be recovered through higher power rates for customers.



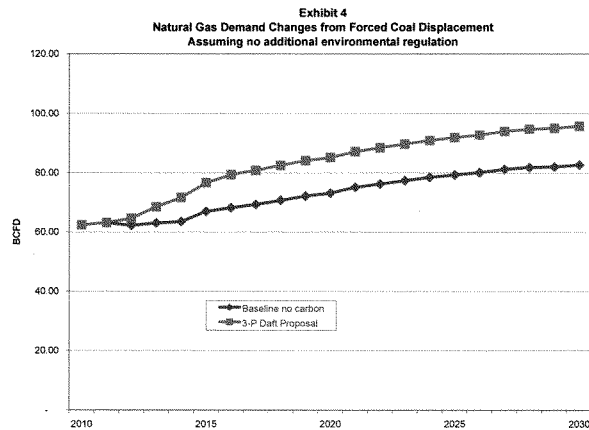
The accelerated coal unit retirements will also result in fewer FGD retrofits than under the no carbon basecase scenario. Under the existing SO₂ programs and enforceable settlement agreements/requirements, an total of 105.3 GW of retrofitted FGD controls will be installed at a capital investment cost of \$49 billion (2009\$). Therefore, the 34.6 GW fewer FGD retrofits will lower FGD investments by \$17.6 billion that will offset a portion of the replacement capital costs. (Note: the stricter NOx program however will also increase NOx capital investment costs by \$8.9 billion. The Carper 3-P proposal excluding mercury compliance costs will result in a net larger power industry capital investment (FGD, SCR, and replacement capacity) of \$67.8 billion (2009\$) that will be passed onto consumers as higher rates.

Gas Supply Shortage Risks and Higher Long-Term Natural Gas Prices from Rapidly Increasing Gas Demand

As outlined above, 675 TWh of coal generation displacement must be replaced with increased supply from non-sulfur sources (nuclear, renewable gas) and greater energy conservation measures. Given the difficulties in permitting new nuclear units, grid limitations on the amount of incremental variable renewable generation possible without creating reliability problems and limits on energy conservation program performance, most coal displacement will likely be replaced with new gas combined cycle generation.

As shown in Exhibit 4, natural gas demand from this coal displacement may increase by 13 BCFD by 2030 (vs. no carbon baseline levels)—equivalent to 20.5 percent of total 2008 natural gas demand. This increased demand will trigger the need for expanded drilling and increase the risk of

market shortages despite having large domestic natural gas reserves. If the industry is unable to expand domestic production quickly enough or maintain the needed high production levels, the nation would be forced to become increasingly dependent upon imported Liquefied Natural Gas (LNG) to meet increasing domestic gas demand. US consumers will compete with European and Asian markets for these LNG supplies. During these high demand periods, LNG suppliers will be able to set their product prices based upon avoided oil-based prices that may run as high as \$18/MMBtu (2009\$). This increased natural gas price should result in some price elasticity losses in residential, commercial and industrial demand.

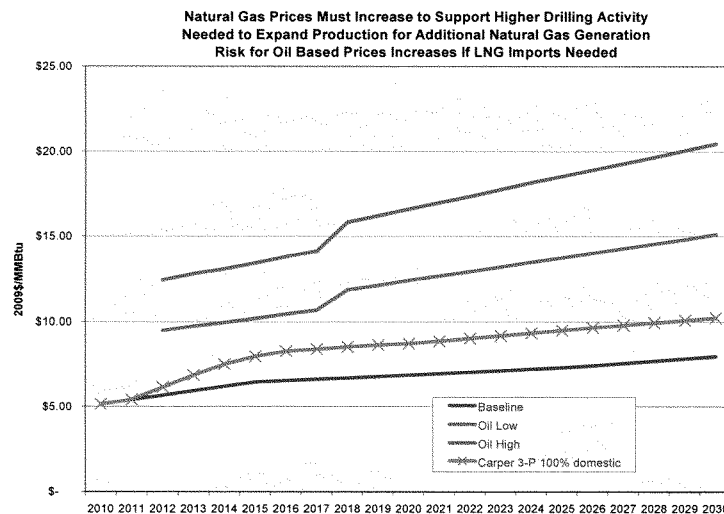


Natural gas industry advocates point to our current low prices (~\$4.50/MMBtu) and glut of supply due to breakthroughs in extraction techniques as evidence that there is much room to increase our natural gas' share of power generation in the long-term. These low prices are not expected to continue much longer, as they are more the product of the recession sharply reducing industrial and commercial demand for natural gas that forced lower prices to move surplus gas into the power sector. Although improved well drilling technology has reduced shale gas production costs, higher prices are needed to support additional well drilling to offset declining output from existing wells and to meet increasing consumer demand as the economy recovers. As demonstrated by the October 1, 2009 NYMEX trading prices, gas prices are expected to rebound strongly with the December 2010 gas futures contracts trading at \$6.91/MMBtu (October 2, 2009) and December 2015 futures at \$7.71/MMBtu.

However, the additional gas demand created by the forced coal displacement not only will trigger development of higher marginal cost reserves (increasing prices) but also will force record breaking rig drilling activity that must by far exceed any historic industry activity. It remains a matter of great debate if the industry can expand and sustain this activity. Although large domestic gas reserves do exist⁷, the dominant shale gas reserves will take a much longer period to extract because of its longer 30-40 year well lifetime. These factors indicate not only high natural gas prices but a

⁷ 2008 Industry Potential Gas Committee assessment increased its natural gas reserve estimate to 2,074 TCF (456 TCF probable (current fields), 787 TCF possible (new fields), 600 TCF speculative (frontier reserves) and 238 TCF proven reserves). Of these reserves, 637 TCF are shale reserves in the lower 48 states and 206 TCF are Alaskan reserves that would require a new pipeline to access.

greater risk of supply shortages and growing dependence upon imported LNG supplies if these record levels cannot be reached and maintained. Assuming that the industry can meet these challenges, the higher natural gas consumption from the power industry alone is expected to increase Henry Hub gas prices (\$2009) as shown in Exhibit 5. As is shown, natural gas prices may need to rise by at the very minimum by \$1.53/MMBtu by 2015, \$1.88/MMBtu by 2020, \$2.20/MMBtu by 2025, and \$2.26/MMBtu by 2030. However, if domestic production is insufficient, prices could quickly escalate to much higher avoided oil based prices. These imported LNG prices can rise to \$5.00-12.50/MMBtu (2009\$) higher than domestic gas production costs.



These market price increases will affect not only the power industry but also be passed onto all other major gas consumers (residential, commercial and industrial) as well. Overall, the natural gas price increases will increase residential, commercial and non-power industrial gas costs at a minimum of \$26 billion (2009\$) in 2015, \$34 billion in 2020, \$41 billion in 2025 and \$43 billion by 2030. If the increased power demand triggers imported LNG avoided oil based prices, residential/commercial/non-power industrial costs could escalate by an additional \$5-12.50/MMBtu or by more than \$100-250 billion/year. These higher gas costs could result in shifting some additional industrial production offshore and significantly increase residential heating bills.

The market price increase would also be passed onto the existing baseline power industry customers reaching by a minimum of \$102 billion (2009\$) in 2015, \$136 billion in 2020, \$173 billion in 2025 and \$186 billion in 2030. If the increased power demand triggers imported LNG avoided oil based prices, existing baseline power customers costs could escalate by more than \$500 billion/year in natural gas costs alone.

This conclusion conflicts with the July 2009 EPA Analysis that projected a far smaller change in natural gas prices (<\$0.15/MMBtu) because of their selection of a shorter forecast period (2025 vs. 2030) (a) avoids achieving emission cap levels and (b) lowers their needed accelerated coal

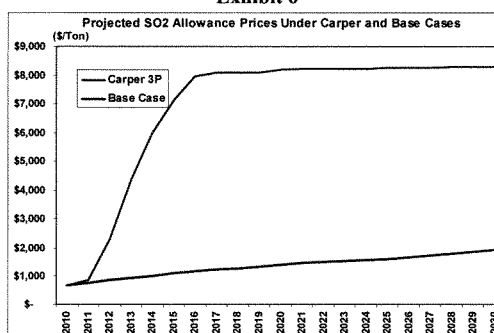
retirements (700 MW vs. 85.6 GW) to reach the equilibrium levels until 2025-2030.⁸ In combination with EPA's more aggressive environmental control performance input assumptions (input assumption vs. EVA 95% removal performance) results in far less coal generation losses (20.5 GW by 2025 vs 675 TWh by 2030 in this analysis) and therefore much smaller incremental increases in gas demand (12 GW of increased NGCC generation).

SO₂ Allowance Prices Shift from Marginal Retrofit Costs to Coal Displacement Costs—Further Increasing Allowance Values as Gas Prices Pushed Higher.:

As the natural gas price increases, the cost of displacement of coal with natural gas combined cycle generation will also increase. This high cost will result in higher marginal costs set by SO₂ allowance values needed to reduce coal power levels to 1,725 TWh. Should carbon capture technologies be forced on coal generation that would reduce the coal generation limit, the SO₂ allowance price would be forced even higher as the high parasitic loads from the carbon capture controls reduces the boiler efficiency by 10-45 percent.

The SO₂ market price is expected to be initially set by price needed to justify incremental FGD retrofits. However, as discussed earlier, the longer term SO₂ price will be set at value needed to displace sufficient coal generation to meet limit. As a result, the higher natural gas prices needed to support the higher gas production will push SO₂ prices even higher than shown in Exhibit 6 (assumes domestic production setting prices).

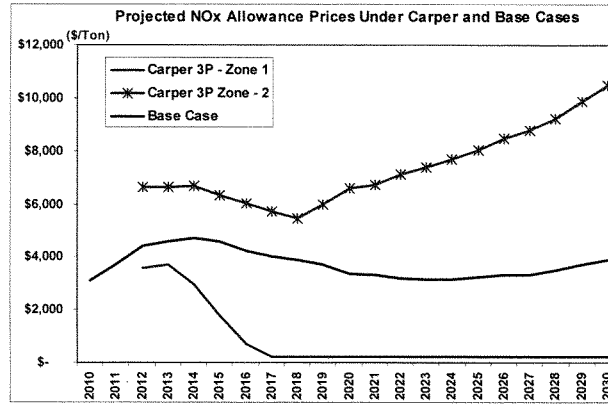
Exhibit 6



NO_x Prices Expected to Collapse in Zone 1, Rapidly Escalate in Zone 2

The draft proposal would divide the annual NO_x allowance market into two zones—a 32 state Eastern zone comprised mostly of the CAIR states and the remaining 18 state Western zone. An overview of the annual NO_x prices for both zones is shown in Exhibit 7.

⁸ EPA's emission path will result in a significant number of large coal unit retirements (>50GW) over a short period (2025-2030) that could create significant industry disruptions. The EVA analysis spreads these retirements over a longer period to reduce the industry disruption and therefore has more earlier retirements.



As is shown the two NOx allowance market zones created will act very differently. The Eastern zone (Zone 1) is already participating in the annual NOx cap & trade program created by the Clean Air Interstate Rule (CAIR). Large amounts of advanced NOx controls have already been retrofitted onto coal units as part of the power industry strategies to comply with the existing CAIR rule and its predecessor- the EPA Ozone SIP Call program. The proposed Carper program will require additional control retrofits and some accelerated coal retirements to achieve the tighter annual NOx cap. As a result, zone 1 prices should increase to increase to \$3,710/ton by 2013 to justify the needed retrofit NOx controls. After 2013, Zone 1 NOx values are expected to steadily decline as the forced retirements of smaller, older coal units from the SO2 program requirement should reduce overall industry zone 1 NOx emissions to below the emissions cap. Given the growing allowance surplus, NOx prices may decline to their SCR control variable costs—roughly \$200/ton (2009\$) by 2017.

Having been exempted from the earlier Clean Air Interstate Rule and EPA Ozone SIP Call programs, the Western Zone 2 sources will be forced to retrofit more SCR controls that require much higher allowance prices to cover their marginal costs⁹. Zone 2 NOx prices are expected to initially peak at \$6,680/ton in 2014 to justify needed retrofit SCR controls. After a following 4-year period of market price declines, NOx prices are expected to steadily increase for the remaining forecast period as generation growth requires justifying additional retrofit SCR control measures.

Mercury Control Limitations Can Be Problematic for Certain Coal Types

The draft proposal would require at least a 90 percent mercury removal requirement across all coal fired generation by 2015. Given the current status of mercury control technology options, a significant technology compliance risk exists to reach a 90 percent removal requirement for units burning sub-bituminous and lignite coals. These coals account for 52 percent (541 million tons) of the 2008 power industry coal use. These coals pose a much greater technical challenge given their much higher portion of flue gas mercury emissions is elemental mercury that is more difficult to

⁹ One major reason for the higher costs is that the initial baseline NOx emission level can be much lower for the PRB designed boilers. Therefore, although the capital costs maybe the same, the amount of incremental NOx reductions are less and the cost per ton removed is higher.

remove. If no reliable technology options can be developed for these coal types, the industry must either switch to alternative coals, trigger additional unit retirements or change the requirement (not allowed in current language).

Increased Compliance Risk Created by Shifting to 100% Auction Format in 2012

The proposal will fundamentally change environmental allowance market risks for all fossil fuel users. Beginning in 2012, the allowance programs would shift from providing affected sources no cost allowances to 100 percent allowance auction. This shift forces affected sources to become totally dependent upon purchased allowances for all future operations and thereby significantly increases market uncertainty and price risk to power industry compliance planning. The future markets will depend heavily upon companies willingness to make multi-billion environmental control investments given these allowance market uncertainties in combination with uncertainties of future regulation (e.g. HAP's, visibility, NAAQS changes). Those sources able to easily pass on the costs to their consumers will gain a significant market advantage over those sources that cannot (e.g. merchant plants, energy intensive industries competing in international markets).

Conclusion:

EPA analysis projects that the industry will spend more than \$82 billion on SO₂ and NO_x emissions controls.¹⁰ Despite these massive investments, the industry would still be unable to meet the strict limit of 1.5 million tons emissions cap once allowance stockpiles are consumed and without capping coal generation at 35 percent below 2008 levels (1,725 TWh). Unable to fully utilize their retrofitted cleaner facilities without exceeding the emissions cap, the industry would be forced to retire old coal units or turn existing ones offline- *units they have spent tens of billions of dollars to upgrade to meet existing emissions standards*. Due to these retirements, they are forced to consider other power options to meet ever-growing load demands- namely gas combined cycle or nuclear power. Constructing these new plants represents billions of additional dollars- investments that would be financed primarily by the ratepayer in the form of rate increases. Increased demand for natural gas to would inevitably increase gas prices, which would hit the ratepayer and other gas consumers once again.

Implementing such a strict emissions cap would force much higher electricity prices and greatly increase the investment risk for new environmental control measures. Why invest if there is a great risk that the plant will eventually be cut back and/or retired?

¹⁰ This EVA capital cost estimate includes the baseline capital investments of \$43.4 billion to meet existing state and federal governmental obligations.

APPENDIX A

EVA Evaluation of July 2009 EPA Analysis


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COALCAST

FUELCAST

August 28, 2009

 FROM: Tom Hewson
 Dave Pressman

EVA Evaluation of
EPA Analysis of Alternative SO₂ and NO_x Caps for Senator Carper (July 31, 2009)

EPA Report responds to a July 10th request from Senator Carper in which EPA evaluated 6 alternative control scenarios. For the purpose of this review, a focus has been placed on scenario #2 that is patterned on the current draft of *Clean Air Planning Act of 2009*. The draft proposal calls for a reduction of the annual SO₂ emission cap to 3.5 million tons/year from 2012-2014 and reaching 1.5 million tons/year in 2015 and beyond. The proposal would also require a national industry NO_x emission cap to drop from 1.79 million tons/year from 2012-2014 and reaching 1.62 million tons in 2015.

This EPA analysis suggests that further SO₂ and NO_x emission reductions can be made for far less cost than the health benefits it would create. Since this analysis was completed within 3 weeks of the request, the agency did not have sufficient time to conduct a thorough air quality modeling and comprehensive cost benefit analysis or to provide sufficient documentation to independently justify their findings. A discussion of both the compliance cost and health benefit assessment is provided below.

Compliance Cost Analysis:

EPA estimates incremental compliance cost ranges from the current Carper-Alexander-Collins-Kloburche proposal¹¹ would increase incremental annual compliance costs by \$1.6 billion in 2012 and would slowly escalate to \$5.0 billion/year by 2025. These estimates exclude compliance costs for the proposal's mercury reduction provisions (EPA not enough time) as well as the extensive \$43 billion in environmental control investments that the industry will already make in incremental emission reduction measures to comply with existing federal and state regulations and agreements¹².

The compliance cost estimates are highly sensitive to EPA modeling assumptions on electricity demand, surplus allowance bank consumption, future regulation and environmental control cost & performance. An examination of EPA's analysis reveals that many EPA input cost assumptions in their Integrated Planning Model (IPM) v. 3 are outdated in comparison to current control costs. The

¹¹ Their draft proposal dated August 7, 2009 is similar to Scenario #2 in the EPA July 31, 2009 analysis.

¹² EPA assumes that the 74.84 GW of retrofit FGD controls and 27.8 GW of retrofitted SCR controls will be required to meet current industry obligations under enforceable Settlement Agreements, stricter state regulations and existing EPA requirements. Since these compliance costs (roughly \$43 billion capital alone) are assumed to be independent of the proposal, their compliance costs are included in the reference baseline and not part of the compliance cost. The baseline FGD retrofits are expected to lower industry SO₂ emissions to roughly 4 million tons/year by 2025.

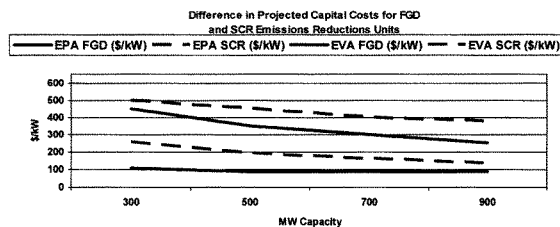
EPA model incorporates FGD and SCR emission performance assumptions that exceed the industry's current average technology control performance. Finally, the analysis consumes the emissions allowance bank throughout the forecast period (->2025) permitting industry emissions to remain above the proposed caps and thereby mask the proposal's impact when equilibrium levels are reached (2028-2032). The analysis illustrates how these flawed input assumptions can contribute to underestimating cost and understate the compliance challenges many emitters face in meeting such strict emissions limits.

Emissions Reductions: The draft *Clean Air Planning Act* emissions requirements (Scenario 2) will represent a substantial drop from actual 2008 SO₂ emission levels of 7.55 million tons. To meet existing enforceable governmental requirements, EPA projects emissions industry emissions will be reduced by 47 percent (to 4.0 million tons/yr) by 2025. Under the current draft proposal, the industry emissions would reach 1.8 million tons by 2025. Industry emissions remain would above the 1.5 million ton cap through 2027 by consuming their supply of banked allowances. Therefore, the draft proposal's equilibrium compliance cost was not calculated by the EPA analysis since it does not occur until after the forecast period.

Emissions Control Performance: The proposed 1.5 million ton SO₂ emissions cap will effectively cap the allowable coal generation once all banked allowances are consumed. If the model had applied the average 2008 FGD control performance¹³, coal generation would need to remain below 1,111 TWh/year to comply with the emissions cap. *This would represent a 44% decrease in nationwide 2008 coal generation (1,994 TWh).* However, EPA model incorporates a much improved control performance-- roughly half of actual 2008 performance levels. If such a technology control improvement was reached, coal generation levels would be capped at current levels.

Capital Costs: In addition, EPA model underestimates compliance costs by applying outdated environmental control costs that are far below industry's current costs. As illustrated in Exhibit 1, the EPA analysis underestimates retrofit capital costs by roughly \$250/kW for FGD and an additional \$250/kW for SCR. This flaw results in EPA significantly underestimating capital costs for NO_x and SO₂ controls in their analysis by more than \$23 billion (\$2009). Had EPA tried to

include mercury, the costs would have been even greater.



Conclusion: EPA analysis projects that the industry will spend more than \$82 billion on SO₂ and NO_x emissions controls.¹⁴ Despite these massive investments, the industry would still be unable to

meet the strict limit of 1.5 million tons emissions cap once allowance stockpiles are consumed and without capping coal generation at 44 percent below 2008 levels (1,111 TWh). Unable to fully utilize their retrofitted cleaner facilities without exceeding the emissions cap, the industry would be

¹³ According to the EPA 2008 CEMS data, the average emission rate for the coal fired units with FGD controls was 0.27#SO₂/MMBtu or roughly 2.7 #SO₂/MWh (@10,000 Btu/kwh heatrate)

¹⁴ This EVA capital cost estimate includes the baseline capital investments of \$43.4 billion to meet existing state and federal governmental obligations.

forced to retire old coal units or turn existing ones offline- *units they have spent tens of billions of dollars to upgrade to meet existing emissions standards*. Due to these retirements, they are forced to consider other power options to meet ever-growing load demands- namely gas combined cycle or nuclear power. Constructing these new plants represents billions of additional dollars- investments that would be financed primarily by the ratepayer in the form of rate increases. Increased demand for natural gas would inevitably increase gas prices, which would hit the ratepayer once again.

Implementing such a strict emissions cap would, in the worst case, nearly bankrupt the power industry, as the installed yet unusable control equipment would represent billions in sunken costs. At the very least, enacting an impossible-to-achieve emissions cap would bring forth huge rate increases for consumers, and create serious disincentive for utilities to improve the efficiency and pollution control performance of their power fleet. After all, why would you enter a race if the finish line is constantly being moved back?

Health Benefit Analysis:

EPA's analysis of Sen. Carper's proposed 3-P bill contains several flaws in its analysis that projects \$50-250 billion/year in health benefits would be created from incremental emission reduction scenarios. These benefits are primarily attributable to decreases in fine particulate levels lowering the premature mortality risks. Benefit analysis was built through applying several "simplifying" assumptions that bias and overestimate calculated health benefit.

- 1) EPA Model projects changes in a population weight average ambient fine particulate level for changes in SO₂ and NO_x emissions
 - a. The model applies oversimplified ambient air chemistry for conversion of sulfur dioxide and NO_x to ambient fine particulate levels. Conversion is heavily dependent upon ammonia availability and temperature that can vary widely by time and location. Proper conversions should be done on a regional basis, and extrapolating such conversions to a national scale is inaccurate.
 - b. The model estimates ambient level changes from national emission reductions, and takes no account of local areas being in attainment vs. non-attainment. Absent in the EPA analysis is any attempt to estimate changes on a regional and specific air quality control region basis. The lack of detail to local air quality conditions leaves the study unable to quantify how many people would be shifted from non-attainment to attainment areas under the 6 EPA modeled scenarios.
 - c. What this essentially means is that the national model takes air quality conditions in areas that are in non-attainment, such as parts of Ohio, and often extrapolates these results to areas that are already in attainment. At the end of the day, national air quality concentrations are difficult to quantify, as air quality benefits are local. A more specific and time consuming analysis would have examined the effect of the Carper bill in non-attainment areas, and paid more attention to local and regional air quality conditions. A proper analysis would have avoided making oversimplified national impact statements using local results that differ wildly from region to region.
- 2) The EPA analysis assumes a causal relationship between fine particulates (PM 2.5) and premature death and morbidity health effects that are suspected but specific mechanisms and pathways have not yet identified.

- a. The analysis assumes that observed public health effects are a function of particulate size, not its chemistry or its toxicity. Studies by Emory suggest that fine particulate chemistry maybe a much greater risk factor¹⁵.
 - b. EPA assumes no threshold linear health risk model to estimate public health benefits from changes in ambient fine particulate levels.
 - i. The linear no threshold model assumes that the risk per unit change in concentration is the same independent of the ambient level being either above or below fine particulate standard. In other words, the study assumes there will be no safe ambient concentration without any measurable fine particulate health risks. This theory runs counter to the idea that standard is set at levels below which there will be no demonstrated or measurable public health impacts.
 - ii. EPA's analysis establishes a range in average risk estimates from only 2 published studies—Pope 2002 and Laden 2006. These studies depend heavily upon health data collected during periods before ambient fine particulates were measured.
 - c. A quick analysis of SO₂ emissions in the United States in the last 10 years suggests that reductions in emissions levels produce little or no positive impact on public health improvements. Sulfur dioxide (SO₂) emissions have dropped from 13.1 million tons in 1998 to 7.61 in 2008.¹⁶ If there was indeed a strong causal relationship between the particulate emissions and health impacts, we should expect to see fewer premature deaths, reduced levels of asthma and bronchitis and other quantifiable public health improvements. However, health statistics suggest that asthma cases are increasing, not declining during this period. Either the fine particulate association is weak or other factors are much more dominant.
- 3) EPA study inaccurately quantifies avoided public health benefit values
- a. The vast majority of the calculated health benefits are from avoided premature mortality - \$8.33 million/premature death. EPA's analysis does not distinguish between age, quality of life, location or any other number of factors essential when examining risk for pre-mature death or other health concerns. For example, we should expect that an elderly person in a highly-polluted non-attainment area such as Indiana would be at a different risk level than a young, healthy individual in California, which is in attainment with its air quality standards. The EPA analysis makes no differentiation between different demographic groups in its input assumptions. As a result, its final data is inaccurate.
 - b. Although health risk is associated with highest risk groups, EPA's analysis does not quantify how much life expectancy changes between the different risk groups.

Conclusion: The EPA analysis that the Carper proposal will create \$50-250 billion/year of public health benefits makes several simplifying input assumptions that significantly overestimate the public health risk and its projected benefit. The most serious flaw is its use of a linear non-threshold health effects model that assumes that the public health benefits from reducing fine particulate levels is the same per ppm ambient air quality improvement for areas in attainment as for areas out of attainment. In short, there is no safe ambient level of fine particulates. The implication is that any activity creating either SO₂, NO_x or fine particulates will result in measurable public health.

¹⁵ The two year ARIES study (Aerosol Research Inhalation Epidemiological Study) examining Atlanta hospital and air quality found no association between sulfates and health effects. The strongest health effect correlations reported were with carbon monoxide elemental carbon and large coarse particulates.

¹⁶ Data obtained from EPA's Clean Air Markets Section:
<http://camddataandmaps.epa.gov/gdm/index.cfm?fuseaction=emissions.wizard>

Senator CARPER. Senator Voinovich, thank you very much.
We have been joined by Senator Tom Udall of New Mexico. Tom, you are welcome to make a statement if you would like to. And thanks a lot for coming.

**OPENING STATEMENT OF HON. TOM UDALL,
U.S. SENATOR FROM THE STATE OF NEW MEXICO**

Senator UDALL. Thank you, Senator Carper, and I know that you have been working on this a very long time and this is something close to your heart. So, I wanted to come here.

Senator CARPER. Thanks so much.

Senator UDALL. Thank you for holding the hearing.

One of the things that I think that we are talking about here is how to save lives and create jobs by promoting pollution reduction investments. The three pollutants we are discussing, nitrogen oxide, sulfur dioxide and mercury, cause heart disease, stroke, lung cancer, asthma and developmental problems for pregnant women and young children.

Interestingly, President Bush and his EPA appointees sought to develop and expand cap-and-trade systems for these pollutants during his administration. Federal courts struck down many of these efforts as failing to go far enough to protect public health as required under the Clean Air Act.

While the Bush administration's actions primarily addressed eastern States, subsequent EPA action and Senator Carper's bill will likely also address coal plants in the Four Corners area and throughout the West. Reducing pollution there is a very good thing, and I look forward to learning more about how EPA plans to proceed, and Senator Carper, how your legislation would affect us in the West.

So, thank you for doing this, and I cannot stay too long, but I am going to follow this closely and have my capable staff here with me.

Senator CARPER. Excellent. Thank you so much for being here, for your statement and for working with us.

My partner, not in crime, but my partner in clean air and hopefully job creation and some other good things as well, Lamar Alexander.

**OPENING STATEMENT OF HON. LAMAR ALEXANDER,
U.S. SENATOR FROM THE STATE OF TENNESSEE**

Senator ALEXANDER. Thank you, Tom.

Yesterday, I had a visitor come by who is an entrepreneur, and he brought these little things. These are pellets of limestone which are made from CO₂. Not coal ash, but CO₂. In other words, he says that he can take the CO₂ that comes out of—the carbon that comes out of coal plant smokestacks, and turn it into limestone that can then be used in concrete and aggregate the way coal ash and others is. And I said, well, if you figure that out, you are going to make 2 or 3 billion dollars and solve a great big problem that we have.

I only bring that up here today to point out that while this bill has nothing to do with carbon, this bill has a lot to do with our ability to continue to use coal as a primary source of low cost electricity in our country which I think we must do if we want to keep

jobs here. And I am optimistic that before very long there will be more than one way to turn to solve the carbon problem. And hopefully it is going to be a low cost problem.

We still have some disagreements over how to regulate carbon coming out of coal plants. But what I think Senator Carper and I are saying, along with the other 9 co-sponsors of the bill, is we can continue to talk about carbon, but in the meantime there is no excuse remaining for not moving ahead to do what we know how to do with SO_x , NO_x and mercury.

We know what to do. An enormous amount of work has been done on this. Senator Voinovich has been working on this almost during his whole career here. And during that time it was said by the environmental groups, well, we want to deal with all four pollutants, including carbon. Well, we do not need to wait for carbon. We can go ahead with this and continue to work on carbon.

And then some said, well, we would rather do it with a Democratic President and a Democratic Congress than a Republican President and a Republican Congress. Well, we have got one here. That is the condition that we have. So, there is really no excuse remaining for not going ahead and cleaning up the air, which we know how to do.

So, we have got the expertise, we have got the bipartisan support, we have got a history of hard work, we have got conditions that are right, we have got Republicans and Democrats who would like to see it done. So, we should do it this year.

And the reasons are pretty obvious. The Environmental Protection Agency, for one thing, is going to be toughening the ambient air quality standards; in other words, the conditions that metropolitan areas have to meet in terms of clean air, putting almost every major metropolitan area in America out of compliance.

Well, what does that mean? Well, that means—Tom mentioned the three of us were Governors. When I was Governor and Nissan came to Tennessee, what was the first thing they did? Well, they went down to the Air Quality Board to get an Air Quality Permit to operate their paint plant. And if they could not have gotten an Air Quality Permit to operate their paint plant, because the air was too dirty around Nashville, they would have taken their plant to Georgia or to some other place where they could have gotten a permit.

So, this is a jobs issue for us. It will enable us to give certainty so that we can continue to use low cost reliable coal, which comes from America so we do not have to depend on other countries, and we can figure out the carbon thing as we go along.

It is very important for our health, as has been mentioned by the other Senators. And in our part of the world, in eastern Tennessee, where I live, we have 10 million tourists who come in every year to see the blue haze that the Cherokees used to sing about, and not the smog that comes from air pollution from coal plants. And they are not all TVA plants, either. A lot of it blows in.

So, I want to give Knoxville and Chattanooga and Nashville and Memphis and all of our cities and metropolitan areas across the country a chance to be able to meet their air quality standards. They will not have that chance unless we have strong national standards on pollution from coal plants of SO_x , NO_x and mercury.

So, my hope is to Senator Udall, Senator Voinovich, Senator Carper, all of us—I think this is not one of those occasions where we just take positions and shout at each other. We are not going to do that here. We have all done too much work on it. We have actually got a good chance to pass this bill this year.

And I am looking forward to hearing from the Environmental Protection Administration and from the industry and from environmental groups and others how we can improve the bill. If we made some mistakes in it, we need to know that so we can improve it. That is what this hearing is about. If we are being unrealistic, we need to know that. I am very interested in what the actual cost will be. Those are my questions. I am for low cost electricity. I am for cleaning up the air. And I think this year is the time to do it.

Thank you.

Senator CARPER. Thank you, Senator Alexander.

I am going to ask for unanimous consent to enter for the record a number of letters of support for our legislation and a GAO report dated October 2009 on mercury control technology at coal-fired plants. Without objection, that will be part of the record. Thank you.

[The referenced letters follow:]



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 THOMAS D. THACHER, II
 JOEL H. TREISMAN
 TONY ZAZULA

EXECUTIVE
 DIRECTOR
 BRIAN L. HOUSEAL

The Honorable Thomas Carper
 United States Senate
 Washington, DC 20510

Dear Senator Carper:

On behalf of the Adirondack Council, I write to express our support for your new legislation, the *Clean Air Planning Act of 2010*. This bill, which amends the Clean Air Act, would reduce power plant emissions of sulfur dioxide by about 85 percent, nitrogen oxides by about 50 percent and mercury by at least 90 percent. If passed into law, it would have a significant benefit to the eastern half of the country, where air pollution has the greatest human health and environmental impacts. We would expect that the Adirondack Park of upstate New York would see the greatest benefits as it has suffered the most from acid rain and has been a hot spot for mercury deposition for decades.

Numerous studies have shown that the Adirondack Mountains have suffered some of the most devastation in the country due to the scourge of acid rain, caused by the emissions of sulfur dioxide and nitrogen oxides, which often come from Midwestern coal burning power plants. This has caused severe damage to the over one million acres of true Wilderness within the Adirondack Park, as well as causing nearly 700 of our water bodies to lose their ability to sustain their native fish populations due to their unnaturally low pH.

In addition, the New York State Department of Health advises that women of childbearing age and children under age 15 should not eat any of six varieties of fish taken from either Adirondack or Catskill water bodies due to high levels of mercury contamination. Another eight species should not be consumed by women and children more than once a week for the same reason.

More recently, studies have concluded that if there is not a dramatic decrease in the emissions that cause climate change, upstate New York, including the Adirondack Park, may have the climate currently

The mission of the ADIRONDACK COUNCIL is to ensure the ecological integrity and wild character of the ADIRONDACK PARK.

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 103 Hand Avenue, Suite 3 P.O. Box D-2 Elizabethtown, New York 12932-0640 TEL 518-873-2240 FAX 518-873-6675

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associated with southern states like Virginia or Georgia by the end of the century. This would create tremendous problems for the Adirondacks. Warmer weather would lead to the invasion by more exotic species, harming our native flora and fauna. Some species of trees associated with the colder climate of New York, such as the sugar maple, would slowly begin to move north to the cooler temperatures of Canada. Birds, such as the rare Bicknell's Thrush, would also leave New York in search of cooler breeding habitat. In addition, there would be many fewer days with snow cover on the ground in the Adirondacks, greatly diminishing the winter tourism economy now associated with activities such as cross country and downhill skiing, ice fishing, snowmobiling and snowshoeing.

This legislation is needed now more than ever. With recent court decisions that have affected EPA's Clean Air Interstate Rule (CAIR) and Clean Air Mercury Rule (CAMR), the Agency may take several more years to rewrite and finalize new regulations that address sulfur dioxide, nitrogen oxides and mercury. Even after revised regulations are finalized, future litigation may cause further delays with these rules or cause them to be vacated. Congress now has a chance to address these pollutants simultaneously and this year. We hope you and your colleagues will act soon.

As the bill is being considered in the Senate, we encourage you to examine the possibility of strengthening the reductions in nitrogen oxides. More stringent requirements will assist states like New York in meeting the new National Ambient Air Quality Standards (NAAQS) for this pollutant.

Once again, we endorse your legislation, the *Clean Air Planning Act of 2010*, and will encourage your colleagues to become co-sponsors of it and pass it in the Senate as soon as possible. We thank you for all of your efforts to limit the negative impacts of the air pollutants addressed in this bill and for championing this issue for nearly a decade in the Senate. We look forward to working with you to ensure the bill's passage and protect the people and environment of the Adirondack Park and the entire country.

Sincerely,



Brian L. Houseal
Executive Director

**American Lung Association - American Thoracic Society - Clean Air Task Force -
Clean Air Watch - Clean Water Action - Environmental Defense Fund -
National Parks Conservation Association- National Wildlife Federation -
Physicians for Social Responsibility**

February 4, 2010

The Honorable Tom Carper, Chairman
Subcommittee on Clean Air and Nuclear Safety
Committee on Environment and Public Works
United States Senate
Washington, D.C. 20510

Re: Carper-Alexander-Klobuchar-Collins Clean Air Act Amendments of 2010

Dear Chairman Carper:

On behalf of the undersigned clean air, public health, medical professional and environmental organizations, we write in strong support of the Carper-Alexander-Klobuchar- Collins Clean Air Act Amendments of 2010. This legislation will strengthen the Clean Air Act to provide immediate pollution reductions from the electric generating sector and provide critical public health and ecosystem protection.

Specifically, the legislation will:

1. Codify the first phase of the Clean Air Interstate Rule (CAIR) until 2012;
2. Extend the Acid Rain program to reduce fossil-fuel power plant emissions of sulfur dioxide (SO₂) by 80 percent by 2018;
3. Reduce fossil-fuel power plant emissions of nitrogen oxides (NO_x) by more than 50 percent by 2015; and
4. Establish a mercury standard for utility-wide Maximum Achievable Control Technology (MACT) that requires a reduction of fossil-fuel power plant mercury emissions by at least 90 percent and establish a statutory "backstop" if EPA fails to implement the rule by 2012.

This legislation is urgently needed to ensure power sector emission reductions of nitrogen oxides (NO_x), sulfur dioxide (SO₂), and mercury. EPA's analysis of the cap levels in the bill demonstrates that these pollution reductions would result in tens of thousands of saved lives per year with hundreds of billions of dollars in annual human health benefits. It would also provide a crucial "backstop" to the EPA MACT process, in case events preclude EPA from finalizing and/or implementing utility MACT rules.

We commend you for your leadership on clean air and support your efforts to hold the line against any attempts to weaken the legislation or otherwise undercut the requirements of the Clean Air Act.

Very truly yours,

Charles D. Connor
President & CEO
American Lung Association

Fred Krupp
President
Environmental Defense Fund

CAA 2010 Letter February 4, 2010

Stephen C. Crane, PhD, MPH
Executive Director
American Thoracic Society

Armond Cohen
Executive Director
Clean Air Task Force

Frank O'Donnell
President
Clean Air Watch

John DeCock
President
Clean Water Action

Thomas C. Kiernan
President
National Parks Conservation Association

Larry Schweiger
President and CEO
National Wildlife Federation

Peter Wilk, MD
Executive Director
Physicians for Social Responsibility

cc. The Honorable Lamar Alexander
The Honorable Amy Klobuchar
The Honorable Susan Collins
The Honorable Dianne Feinstein
The Honorable Judd Gregg
The Honorable Jeanne Shaheen
The Honorable Lindsey Graham
The Honorable Ted Kaufman
The Honorable Chuck Schumer
The Honorable Joe Lieberman
The Honorable Olympia Snowe



February 4, 2010

The Honorable Tom Carper
513 Hart Senate Office Building
Washington, DC 20010

The Honorable Amy Klobuchar
302 Hart Senate Office Building
Washington, DC 20510

The Honorable Lamar Alexander
455 Dirksen Senate Office Building
Washington, DC 20510

The Honorable Susan Collins
413 Dirksen Senate Office Building
Washington, DC 20510

Dear Senators:

On behalf of the Business Council for Sustainable Energy I would like to thank for your leadership in introducing the Clean Air Act Amendments of 2010, which calls for a multi-pollutant approach to addressing nitrogen oxides (NOx), sulfur dioxide (SO₂) and mercury emissions from the electric power sector.

The Business Council for Sustainable Energy is an industry coalition that includes businesses and trade associations representing a suite of currently available technology options for strengthening domestic economic and energy security while also reducing emissions of greenhouse gases that contribute to global climate change.

The Council believes that if enacted in conjunction with broader energy and climate change legislation, the Clean Air Act Amendments of 2010 would provide a comprehensive, efficient and effective regulatory approach for the electric power sector and would make significant strides in the deployment of existing clean energy technologies, including energy efficiency, renewable energy, demand response and high-efficiency natural gas utilization, including electricity generation. Climate legislation alone will not address emissions from all pollutants; however, significant strides can be made through a multi-pollutant approach.

Clear direction from Congress on greenhouse gas control and the Clean Air Act Amendments of 2010 would encourage energy conservation, use of renewable and clean alternative technologies, and pollution prevention as a long-range strategy for reducing air pollution and other adverse impacts of energy production and use.

As part of this approach, the Council would like to see specific instructions to EPA to recognize the role of energy efficiency and renewables to achieve intended environmental objectives, including robust allowance set-asides for NOx, SO₂, and mercury emissions, so that the value of the environmental benefits of reducing these pollutants through the deployment of clean energy technologies can be achieved and/or monetized. This would allow existing clean generation resources to operate more and would also allow for new, cleaner generation resources to be built. Several states have moved in this direction in their state implementation plans through output based standards and the use of NOx set-asides for energy efficiency and renewable energy, but these programs have not been effective due to administratively cumbersome rules.

The Clean Air Act Amendments of 2010 in conjunction with climate change legislation would provide the tools needed to address emission reductions of harmful pollutants, including

greenhouse gas emissions that contribute to global climate change in a comprehensive, efficient approach.

We thank you for your leadership and support on these critical issues and look forward to working with you to move this legislation forward with comprehensive energy and climate change legislation this Congress.

Sincerely,



Lisa Jacobson, President

About the Business Council for Sustainable Energy

The Business Council for Sustainable Energy is an industry coalition that includes businesses and trade associations representing a suite of currently available technology options for strengthening domestic energy security while also reducing emissions of greenhouse gases that contribute to global climate change. These technologies include: advanced batteries, biomass, biogas, fuel cells, geothermal, hydropower (including conventional and new waterpower resources such as ocean, tidal and in stream hydrokinetic), solar (including solar energy equipment such as solar hot water heating and solar light pipe technology), wind, natural gas, and supply-side and demand-side energy efficiency.

For more information about the Council, please visit us on the web at www.bcsa.org


CALPINE®

February 3, 2010

 CALPINE CENTER
 717 TEXAS AVENUE
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 713.850.2000
 713.330.2001 (FAX)

 The Honorable Tom Carper
 United States Senate
 Washington, DC 20510

 The Honorable Amy Klobuchar
 United States Senate
 Washington, DC 20510

 The Honorable Lamar Alexander
 United States Senate
 Washington, DC 20510

 The Honorable Susan Collins
 United States Senate
 Washington, DC 20510

Dear Senators:

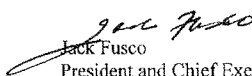
On behalf of Calpine Corporation, I am writing to express our support for the Clean Air Act Amendments of 2010, your multi-pollutant legislation developed to regulate power plant emissions of nitrogen oxide, sulfur dioxide, and mercury. In light of the vacatur of the Clean Air Mercury Rule (CAMR) and the Clean Air Interstate Rule (CAIR) in 2008, this legislation will provide clarity and certainty to the electric power generation industry regarding its future environmental requirements and lead to significant reductions in harmful air pollutants.

Calpine is the nation's largest independent power producer; we own and operate a modern fleet of low-emitting, highly efficient, combined-cycle natural gas-fueled power plants and we own the nation's largest fleet of renewable geothermal power plants. Calpine has been a leader in supporting aggressive legislation and regulations of power plant emissions at the state, regional, and national levels. Our natural gas plants emit significantly fewer air emissions than the electric sector average – we emit 58% less CO₂, 95 % less NO_x, 99% less SO₂ and no mercury. Our company model shows that power generators can meet stringent air emissions limits and still provide efficient and reliable sources of electric power.

The vacatur of CAMR and CAIR has led to great uncertainty in the power generation industry, leading many companies to delay making needed investments in environmental controls. It is imperative that new rules be formulated to replace CAMR and CAIR in order for companies to make decisions to either install pollution controls on existing units or shut down uneconomic units and make way for existing clean generation resources to operate more and for new, cleaner generation resources to be built.

The Clean Air Act Amendments of 2010, together with broader climate change legislation, provide a comprehensive, multi-pollutant approach to cleaning up our nation's air. We thank you for your leadership and look forward to working with you on this legislation.

Sincerely,


 Jack Fusco
 President and Chief Executive Officer
 Calpine Corp.



Eco Power Solutions
Energy Recovery & Emissions Control Systems

March 2, 2010

VIA E-MAIL

The Honorable Thomas Carper
United States Senate
513 Hart Senate Office Building
Washington, DC 20510

The Honorable Lamar Alexander
United States Senate
455 Dirksen Senate Office Building
Washington, DC 20510

Dear Senator Carper and Senator Alexander:

On behalf of Eco Power Solutions, I want to congratulate you on the introduction of the Clean Air Act Amendments of 2010, and express our support for the provisions in the legislation.

Over twenty years have passed since the passage of the Clean Air Act. A landmark bill, it mandated then-unprecedented reductions in emissions from coal-fired power plants. However, those emission standards have not kept pace with pollution levels, and some plants continue to operate without sufficient pollution-control equipment. Sulphur oxide (SOx), nitrogen oxide (NOx), and mercury continue to pose a threat to public health, and have been linked to asthma, damage to the nervous system, acid rain, and smog.

New standards such as the ones you have proposed in your amendments will go a long way towards reducing air quality-based illnesses. They are also a much needed step towards regulatory certainty for the power sector. A strong federal framework for emissions compliance will encourage the use of pollution-reducing technology by our nation's power sector.

Previous measures to limit emissions have met resistance from lawmakers who say that reductions are unattainable and the cost burden on coal-fired plants too severe. We at Eco Power Solutions know that, while your goals are ambitious, they are achievable. Through solutions like ours, utilities and industrial power generators can achieve immediate reductions greater than levels you propose. Through our current generation technology, we offer greater than 96% reduction in emissions of SOx, NOx, mercury and particulate. In addition, our waste-heat recapture capabilities offer an attractive payback timeline.

**Eco Power Solutions**

Energy Recovery & Emissions Control Systems

With “shovel ready” solutions like Eco Power Solutions’ retrofit technology, we believe that utilities can meet the challenge that you have set in a cost-effective manner, using commercially available technology. Eco Power Solutions applauds your commitment to the environment and stands ready to work with you and the congressional leadership to deliver these important amendments to the President’s desk this year.

Sincerely,

ECO POWER SOLUTIONS (USA) CORP.

T.S. (Tom) Thompson
Chief Executive Officer



February 4, 2010

The Honorable Tom Carper
Chairman, Subcommittee on Clean Air & Nuclear Safety
United States Senate
Washington, DC 20510

Dear Senator Carper,

Entergy welcomes the introduction of the Clean Air Act Amendments of 2010 in the new legislative year. We are long-time advocates for action that will enhance air quality and reduce the risk of climate change.

While we would greatly prefer legislation that addresses all four "Ps," including carbon, we agree that clarifying legislation for sulfur dioxide, nitrogen oxide and mercury is necessary and vital. In light of our firsthand experience with storm surges and disappearing coastline in our service territory, we understand that reducing GHG emissions is a critical step toward mitigating the impacts of climate change on our population and natural resources.

We do not believe that difficulties in securing legislation for carbon abatement should hold up resolution of the 3P issues. A legislative "3Ps" approach that clearly authorizes EPA to oversee a market-based program for NOx and SO2 and that provides certainty on required levels of mercury controls is a pragmatic approach to achieve reductions of these three pollutants. It offers market-based flexibility and price signals that are needed to encourage the industry to reduce emissions at the lowest cost possible and in the most efficient manner possible. Currently, it is difficult to forecast the compliance cost of these reductions. Overlapping and inconsistent rulemakings, as well as agency and judicial interpretations, continue to cause confusion within the context of often ambiguous Clean Air Act language. Therefore, it is critical that 3Ps legislation is proscriptive enough to provide regulatory certainty for industry stakeholders and to preempt the confusion currently caused by the new source review permitting process.

We applaud your bipartisan leadership on this issue and look forward to working with you to ensure that federal legislation helps achieve meaningful reductions, offers certainty to the industry, and insulates ratepayers from rate increases caused by inefficient regulation.

Best regards,

J. Wayne Leonard
Chairman & CEO



John W. Rowe
President, Chairman and CEO

Exelon Corporation
P.O. Box 805398
Chicago, Illinois 60680-5398

February 4, 2010

Honorable Thomas Carper
Chairman
Subcommittee on Clean Air and Nuclear Safety
Committee on Environment and Public Works
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

I am writing to lend Exelon's support to the Clean Air Act Amendments of 2010 you are introducing today. This legislation would provide much-needed statutory certainty regarding future environmental regulations for sulfur dioxide, nitrogen oxide, and mercury at a time when the electric power industry is on the verge of making unprecedented investments in new power plants.

The electric power industry faces many challenges as we seek to continue to provide our customers with reasonably-priced electricity while maintaining world-class reliability. The Department of Energy's Energy Information Administration has projected the United States will consume nearly 30 percent more electricity by 2035 than we do today.^[1] This increase is projected to occur even though energy use per capita (as well as per dollar of Gross Domestic Product) is expected to decline over that same period.

A study conducted by the Brattle Group for the Edison Electric Institute concluded that the industry will have to spend \$1.5 trillion to \$2 trillion on electric infrastructure (generation, transmission and distribution) by 2030 to maintain the current levels of electric reliability for our customers.^[2]

As we look at how best to meet our future power needs, it is imperative that we have as much certainty as possible regarding the cost of constructing and operating new power plants. Power plants are built to operate for 60 years or more, so the

^[1] "Annual Energy Outlook 2010 Early Release," Energy Information Administration, U.S. Department of Energy (December 14, 2009).

^[2] "Transforming America's Power Industry: The Investment Challenge 2010-2030," The Brattle Group (November 2008).

investment decisions we make today will affect our energy – and environmental – policy for the next several decades.

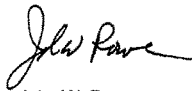
Environmental regulations factor heavily into a company's decision of what kind of power plants in which it should invest. As you know, the Environmental Protection Agency (EPA) is in the midst of a number of rulemakings on air emissions from power plants. These rulemakings include regulations to limit emissions of sulfur dioxides, nitrogen oxides, mercury, and other air pollutants.

Unfortunately, the regulatory process often extends for years and frequently includes protracted and expensive litigation. By statutorily establishing targets and timelines for reducing emissions of sulfur dioxide, nitrogen oxides, and mercury, the Clean Air Act Amendments of 2010 would resolve the uncertainty surrounding the future regulatory structure for these pollutants.

As you know, Exelon has been a leader in seeking clean energy solutions for our nation. Our fleet of 17 nuclear plants provides millions of Americans with an emissions-free source of safe and reliable power. We are anxious to enact legislation that clarifies the regulatory framework for the pollutants addressed in your legislation as well as carbon dioxide and other greenhouse gas emissions.

Thank you for your continued leadership and dedication on this important issue. I look forward to working with you to advance this valuable legislation.

Sincerely,

A handwritten signature in black ink, appearing to read "John W. Rowe". The signature is fluid and cursive, with a prominent "J" and "R".

John W. Rowe



1220 N. Fillmore Street
Suite 410
Arlington, VA 22201
Telephone 703-812-4811
www.icac.com

David C. Foerter, *Executive Director*
Email: dfoerter@icac.com

Hon. Senator Thomas Carper
United States Senate
513 Hart Building
Washington, DC 20510

February 3, 2010

Dear Senator Carper:

The Institute of Clean Air Companies (ICAC) supports "3-pollutant" legislation for the power sector as provided in the Carper-Alexander-Klobuchar-Collins Clean Air Act Amendments of 2010. Multipollutant legislation provides certainty that the regulated community needs to cost-effectively achieve the nation's air quality goals in a timely manner. Regarding technology availability, the nation's air pollution control equipment and monitoring companies have repeatedly answered the call to meet the ever-tightening nitrogen oxide (NO_x), sulfur dioxide (SO₂) and mercury emission limits with innovative and efficient technologies. These large pollution control projects not only reduce the nation's health costs by as much as twenty times the costs of the projects themselves, but supply high-paying engineering and construction jobs. This is what is needed now; green jobs partnered with clean air.

The air pollution control industry has both the technical expertise and manpower capacity to plan and build the hundreds of large projects called for in the Clean Air Act Amendments of 2010. ICAC supports an aggressive schedule for power plant emission reductions in legislation or regulation; recognizing that nearer term projects can create jobs and cleaner air sooner, and initiate sustainable implementation. In fact, an Environmental Protection Agency analysis of an earlier multipollutant bill proposed by Senator Carper concluded that the industry installed nearly 35 gigawatts (GW) of flue gas desulfurization (FGD) and selective catalytic reduction (SCR) in 2009 to reduce SO₂ and NO_x emissions, respectively¹. A similar level of effort could be required on a sustained basis to meet the bill's objectives since of the current 310 GW of coal-fired capacity in the U.S., about 160 GW have FGD and 130 GW have SCR.

The stationary source air pollution control industry stands ready to support the Senators' bold initiative that will employ thousands of skilled American workers over the next decade and clean the air we breathe.

Sincerely,

David C. Foerter
Executive Director, ICAC

¹ See “Carper Analysis Appendix,” Appendix B, slide #15 at <http://www.epa.gov/airmarkets/progsregs/cair/multi.html>

ICAC is the nonprofit association of companies that supply air pollution control technology and monitoring systems for stationary sources. For 50 years, ICAC has worked to assure a nexus of clean air policy and technology that promotes public health, environmental benefit, and industrial progress.

nationalgrid

Rick Carter
Vice President, Federal Government Relations
325 7th Street, NW – Suite 225
Washington, DC 20004

February 3, 2010

The Honorable Thomas R. Carper
United States Senate
Washington, DC 20510

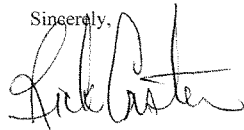
Dear Senator Carper:

National Grid thanks you for your leadership toward implementing a multi-pollutant air quality strategy for the electric sector as well as your long standing support for comprehensive climate legislation. While the electric sector continues to call for Congress to pass climate legislation to allow the industry to make informed and cost effective business decisions, the Clean Air Act Amendments of 2010 addresses longstanding concerns of National Grid's -- ozone, acid rain, and mercury contamination. The bill establishes aggressive yet achievable national standards for reducing power plant emissions of nitrogen oxides (NO_x), sulfur dioxide (SO₂), and mercury. EPA's analysis demonstrates that the legislation will ensure important environmental and health benefits that are especially important to the states in which National Grid operates.

The bill also provides the electric sector the critical business certainty that has been lacking since the D.C. Circuit vacated and remanded the Clean Air Interstate Rule in 2008. National Grid supports a market based regulatory approach for NO_x and SO₂ because it ensures the reductions are achieved at the lowest cost for our customers. We also believe any allowance allocation must encourage energy efficiency and technology innovation and recognize those states and customers who have already invested in lower emitting technologies.

National Grid appreciates your efforts on these important issues, and we look forward to working with you and your cosponsors on this legislation.

Sincerely,

A handwritten signature in black ink, appearing to read "Rick Carter", written over the word "Sincerely,".

Ralph Izzo
Chairman of the Board, President
and Chief Executive Officer

Public Service Enterprise Group Incorporated
80 Park Plaza, 4B, Newark, NJ 07102-4194
tel: 973.430.8394



February 4, 2010

The Honorable Thomas R. Carper
513 Hart Senate Office Building
United States Senate
Washington, D.C. 20510

Dear Senator Carper:

Public Service Enterprise Group (PSEG) is pleased to support the introduction of the Clean Air Act Amendments of 2010. We would like to thank you for the leadership that you have consistently demonstrated over many years in our shared effort to reduce the four major power plant pollutants – nitrogen oxide (NO_x), sulfur dioxide (SO₂), mercury, and carbon dioxide (CO₂).

Prior analyses by the Environment Protection Agency have demonstrated that your legislation will significantly improve air quality and ensure important health benefits by reducing the levels of NO_x, SO₂, and mercury emitted by electric power plants. These benefits are especially important to New Jersey, Connecticut and other states in the Northeast that have taken significant steps to reduce emissions from power generation and other facilities located in those states, but that are struggling to achieve acceptable air quality as a result of emissions from facilities in upwind states. Enactment of your bill will help improve the quality of life for our families, our employees, and our customers.

The Clean Air Act Amendments of 2010 would remove the legal uncertainty created when the U.S. Court of Appeals for the D.C. Circuit issued an opinion vacating and remanding CAIR in 2008. The regulatory vacuum created by the ruling has seriously undermined the emissions trading markets and creates significant business uncertainty for the electric generating industry. If enacted, this piece of important legislation will ensure that critical environmental benefits are achieved through a market-based system as opposed to uncoordinated regulatory compliance mandates that lead to higher costs to consumers and power companies such as PSEG.

Again, we welcome the introduction of your bill and we look forward to working with you to enact legislation that will bring about the reduction of these three pollutants along with the reduction of greenhouse gas emissions.

Sincerely,

A handwritten signature in cursive script that reads "Ralph Izzo".

Ralph Izzo
President, Chairman and CEO
Public Service Enterprise Group

Senator CARPER. I am pleased to welcome our first witness. Thank you for your patience. Senator Alexander likes to call hearings, he says that we really should not call them hearings, we should call them talkings.

[Laughter.]

Senator ALEXANDER. Because we do the talking.

Senator CARPER. We are trying to limit that here this morning. We want to welcome our first panel witness so we can be hearers, not just talkers, and we welcome Regina McCarthy. No stranger to this panel, Ms. McCarthy is the EPA Assistant Administrator for the Office of Air and Radiation. She has spoken before this Committee on a number of occasions on past Clean Air issues. So, we welcome her back.

Ms. McCarthy, you will have 5 minutes to read your opening statement, and the full content of your written statement will be included in the record.

Again, thank you for joining us.

STATEMENT OF REGINA A. MCCARTHY, ASSISTANT ADMINISTRATOR, OFFICE OF AIR AND RADIATION, U.S. ENVIRONMENTAL PROTECTION AGENCY

Ms. MCCARTHY. Thank you, Chairman Carper, and good morning, everyone. Members of the Committee, thank you for inviting me here to testify today, to talk to you about EPA's efforts to mitigate the impacts of emissions from power plants.

As you will recall, I was here just in July of last year. Lots of time has passed, and I am pleased to report that EPA has made significant progress on our regulatory efforts. In my testimony I hope to discuss the status of that effort and provide the Committee with some information on the bill before you, the Clean Air Act Amendments of 2010.

From the outset of this Administration, beginning with the American Recovery and Reinvestment Act, President Obama has made providing clean energy for Americans a top priority. Not only is this enterprise essential to protecting public health and the environment, but it also serves as the cornerstone of revitalizing the economy, spurring innovation and creating new 21st century jobs. That is why your leadership on this issue, Senator Carper and members of the Committee, and that of the co-sponsors of S. 2995, is especially important.

Every day, the emissions of sulfur dioxide, oxides of nitrogen, and mercury from power plants threaten the health and quality of life for millions of Americans. The benefits of reducing air pollution from these sources are not academic. Thousands of premature deaths can be avoided. Lower air pollution from power plants means that we will spend less on healthcare, hospitalizations, and emergency room visits. Reducing air pollution from power plants can mean that we are able to enjoy more sweeping vistas at our National Parks, and we can more confidently eat freshwater fish from my home State of Massachusetts.

But like you, I know that air pollution is not the only thing affecting American lives. Jobs are hard to come by; businesses large and small are struggling. In fact, some people would argue that the

U.S. cannot afford to make the investments in clean air, and now may not be the right time to make those investments.

Well, President Obama, Administrator Lisa Jackson at EPA, and I disagree with that thinking. Making investments in our existing energy sources, updating them to create clean and efficient energy infrastructure, and making investments that create jobs here in America are, in fact, essential to keeping the United States competitive in the global economy.

History clearly demonstrates that the economy can grow while we clean up the air. Since 1990 overall pollution emissions have been reduced by more than 50 percent, while the U.S. GDP, when it is adjusted for inflation, has increased 126 percent.

EPA will soon propose a rule to replace the Clean Air Interstate Rule (CAIR). It will reduce interstate transport of SO₂ and NO_x emissions in the eastern half of the U.S. to help States meet the current health based ambient air quality standards for fine particles and ozone. Working within the framework of the 2008 court decision of the D.C. court that remanded CAIR back to EPA, we are developing a new approach to reduce regional interstate transport of these long distance pollutants while we are guaranteeing that each downwind State non-attainment and maintenance area is getting the reductions it is entitled to achieve under the law. Past analysis shows that the benefits of reducing SO₂ and NO_x emissions from power plants in the eastern U.S. far exceed the cost.

Similarly, following actions by the same court on the Clean Air Mercury Rule, EPA is developing a rule that we intend and hope to propose in March 2011 establishing MACT standards for toxic air emissions from power plants, including mercury, heavy metals and acid gases. We are still gathering the information needed to determine what the level of our MACT standard must be. But it is important to note that according to GAO, many coal-fired power plant boilers have already reduced their mercury emissions by more than 90 percent.

As you have heard from EPA Administrator Jackson at last week's hearing before this Committee on the EPA's proposed 2011 budget, we have not not completed our review of S. 2995 in its entirety. But fortunately, last summer, at your request, EPA conducted an analysis of several different emission reduction scenarios, some of which are very similar to the emissions levels in the time line in this bill.

And based on that analysis, we analyzed emissions, electricity prices and costs, and we estimated the likely health benefits. And our experience in modeling similar emission reduction scenarios, as well as that analysis, indicates that S. 2995 would likely result in tens of thousands of lives saved and as much as hundreds of billions in monetized benefits each and every year, especially when compared to the base case which does not include major new regulations that are being contemplated. These benefits are significantly greater than the estimated costs of implementing the reductions required by the scenarios.

I am confident that whether it is through legislation like S. 2995 or the Clean Air Act regulations that EPA is developing, that reductions in power plant pollution will drive smart investments in pollution control and energy efficiency as well as innovative genera-

tion technologies, all of which will pay back the American people in jobs, in economic growth, and in improved health and environmental protection for years to come.

As EPA continues the air pollution rulemaking that reflect our commitment to protecting public health and the environment and heeding our legal obligations, and as you, Senator Carper, and your colleagues work to advance your legislation, I believe that our respective efforts will be mutually reinforcing. They will not only ensure the pollution reductions that we need but support the President's efforts to clean up our energy supply in a way that is consistent with economic growth.

Thank you for your efforts. I look forward to answering your questions.

[The prepared statement of Ms. McCarthy follows:]

STATEMENT OF REGINA A. MCCARTHY
 ASSISTANT ADMINISTRATOR
 OFFICE OF AIR AND RADIATION
 U.S. ENVIRONMENTAL PROTECTION AGENCY
 BEFORE THE COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
 U.S. SENATE
 MARCH 4, 2010

Chairman Boxer, Subcommittee Chairman Carper, Ranking Member Inhofe, Subcommittee Ranking Member Vitter, and members of the Committee, thank you for inviting me to testify today to update you on EPA's efforts to mitigate the impacts of emissions from power plants. As you will recall, I last appeared before this committee to discuss these issues in July 2009, and since that time I am pleased to report that EPA has made significant progress on our regulatory efforts to address the public health and environmental effects of air pollutants from power plants. In my testimony I will discuss the status of our work on these efforts, and will provide the committee with some information on S. 2995, the Clean Air Act Amendments of 2010.

From the outset of this administration, beginning with the American Recovery and Reinvestment Act, President Obama has made providing clean energy for Americans a top priority. Not only is this enterprise essential to protecting public health and the environment, but it also serves as the cornerstone of revitalizing the economy, spurring innovation and creating new 21st century jobs. That is why your leadership on this issue, Senator Carper, and that of the cosponsors of S. 2995 and of this committee is especially important.

As EPA continues the air pollution rulemakings that reflect our commitment to protecting public health and the environment and to heeding our legal obligations and as you, Senator Carper, and your colleagues work to advance your legislation, I believe that our respective efforts can be mutually reinforcing. They not only ensure the pollution reductions needed, but support the President's efforts to clean up our energy supply in a way that is consistent with economic growth.

Need to Protect Public Health and the Environment

Every day, the emissions of sulfur dioxide (SO₂), oxides of nitrogen (NO_x), and mercury from power plants threaten the health and the quality of life for millions of Americans. Power plant emissions account for over half of total U.S. SO₂ emissions, about 20% of NO_x emissions, and just under half the airborne mercury emissions.

Emissions of SO₂ and NO_x contribute to levels of fine particles (PM_{2.5}) in the atmosphere; NO_x also contributes to the formation of ground-level ozone. The health effects of exposure to elevated levels of fine particles and ozone include premature death, more asthma symptoms in those already suffering from that disease, and respiratory and cardiovascular diseases that are often serious enough to require hospitalization. Emissions of mercury also undergo transformation in the environment, forming methylmercury which builds up in fish, and, in turn, in people and animals who eat mercury-contaminated fish. Methylmercury exposure in the womb can affect children's cognitive thinking, memory, attention, language, and fine motor and visual-spatial skills.

Although current emissions levels of these pollutants continue to pose a danger for public health and the environment, the past 30 years have seen substantial progress in lowering emissions from power plants. In 1980 U.S. power plants emitted 17.3 million tons of SO₂. In 1990, the year Congress passed the Clean Air Act Amendments that included the Acid Rain Program, power plants still emitted 15.7 million tons of SO₂ and 6.7 million tons of NO_x. By 2000 power plant emissions had dropped to 11.2 million tons of SO₂ and 5.1 million tons of NO_x. By 2009, preliminary data show that power plants emitted just 5.75 million tons of SO₂ and 2 million tons of NO_x. The Acid Rain Program was – and is – not just protecting our lakes and streams from acid rain, but also protecting millions of Americans and Canadians from the harmful effects of fine particles. One peer-reviewed study found that the benefits of the power plant reductions from acid rain program outweigh the costs by more than 40-to-1.¹

¹ Chestnut and Mills, 2005, A fresh look at the costs and benefits of the U.S. Acid Rain Program, *Journal of Environmental Management*, vol. 77(3):252-266

This kind of progress makes me confident that renewed efforts to bring these pollutants down to the levels needed to protect against premature deaths, childhood asthma attacks, and acid rain can succeed. There is work yet to be done: although all coal-fired power plants in the U.S. now control particulate matter, and many do control mercury, SO₂ and/or NO_x, many are still operating without advanced controls for SO₂, NO_x, or air toxics. EPA and the Harvard School of Public Health have estimated that a coal-fired power plant operating without these controls results in premature deaths and illnesses.

As you heard from EPA Administrator Jackson at last week's hearing before this committee on EPA's proposed 2011 budget, we have not yet completed our review of S. 2995. Fortunately, last summer my office conducted an analysis for Senator Carper of several different emission reduction scenarios, some of which were very similar to emission limits in S. 2995. In that analysis, which is available on EPA's website², we analyzed emissions, electricity prices, and costs, and estimated likely health benefits. Based on that analysis, and our experience modeling similar emission reduction scenarios, it appears that S. 2995 would likely result in tens of thousands of lives saved and as much as hundreds of billions in monetized benefits each year, especially when compared to a base case without major new regulation. These benefits are significantly greater than the estimated costs of implementing the reductions required by the scenarios.

Clean Air and the Economy

History clearly demonstrates that the economy can grow while we clean up the air. Since 1980, overall pollution emissions have been reduced by 54%. Meanwhile, VMT, energy use, and population growth have grown steeply and U.S. GDP, adjusted for inflation, has increased 126 percent. The benefits of reducing air pollution are not academic; they have a real effect on how we live and what we spend our money on. Less air pollution from power plants means we can spend less on health care for things like asthma attacks, or hospitalizations and emergency room visits for cardiac or respiratory illnesses. It can mean more days at work and fewer employee sick days. Reducing air pollution from power plants can mean we will be able to enjoy more

² www.epa.gov/airmarkets/progsregs/cair/docs/CABriefing.ppt

sweeping vistas at national parks like Great Smoky Mountains National Park, or to eat freshwater fish from a New England lake with less concern for possible mercury contamination.

A Congressionally-mandated 1999 EPA study, which went through extensive peer review, found that for all Clean Air Act programs combined, the benefits from 1990 to 2010 would outweigh the costs by 4-to-1. According to OMB's 2009 "Thompson Report" summarizing the annual costs and benefits of federal regulations, the benefit/cost ratio for EPA air rules between 1998 and 2008 was better than for any other government programs.

Like you, I know that air pollution is not the only thing affecting American families. Jobs are hard to come by, businesses large and small are struggling to get the credit they need, and for many people the economic future looks dimmer than the past. In fact, some people are concerned that the U.S. cannot afford to make the investments we need to clean up our air, or that now is the wrong time to make these investments, or that making these investments will hurt our ability to compete in the global economy.

President Obama, Administrator Lisa Jackson and I disagree with that thinking. Making investments in our existing energy sources, updating them to create a clean and efficient energy infrastructure, and making investments that create jobs here in America, all while reducing the number of people who get sick and the resulting costs to our economy, are, in fact, essential to competing in the global economy.

EPA's Plans

As you know, both the Clean Air Act and recent rulings by the District of Columbia Circuit Court of Appeals require EPA to complete a series of rulemakings to reduce air pollution from power plants. My testimony here last summer made it clear that EPA plans to take smart and effective actions to do this.

EPA will soon propose a rule to replace the Clean Air Interstate Rule (CAIR). This rule will reduce interstate transport of SO₂ and NO_x emissions in the eastern half of the U.S. to help states meet the current health-based air quality standards for fine particles and ozone. This keeps us on

target to meet the two-year schedule we informed the court we would be following to replace CAIR following the D.C. Circuit's remand. Working within the framework of the 2008 court decision, we are developing a new approach to reduce regional interstate transport of these long-distance pollutants while guaranteeing that each downwind non-attainment and maintenance area is getting the reductions it is entitled to under the law. Past analyses show that benefits of reducing SO₂ and NO_x emissions from power plants in the eastern United States far exceed the costs. In addition to these benefits, we anticipate that many of the emission control technologies installed will also help sources meet their maximum achievable control technology (MACT) air toxics requirements.

Similarly, following action by the same court on the Clean Air Mercury Rule (CAMR) as well as our legal obligations, EPA is developing a rule establishing §112(d) MACT standards for toxic air emissions from power plants, including mercury and acid gases. As you know, the MACT program requires us to set our standards for existing sources at a stringency level reflecting the reductions achieved by the top performing 12% of sources.

When I testified in front of you last summer, I was joined on the panel by John Stephenson, Director of Natural Resources and the Environment at GAO, who testified about their analysis of mercury control technology in the power sector. That GAO report, now final, states that "commercial deployments and 50 DOE and industry tests of sorbent injection systems have achieved, on average, 90 percent reductions in mercury emissions."³ We are still gathering the information we need to determine what the level of our MACT standard will be; we believe that some coal-fired power plant boilers have already reduced their mercury emissions by 90%. Some have been able to make even larger reductions.

I have committed to you that I will follow the data EPA is now collecting when setting the utility MACT standard; that, after all, is what the law requires. Once the rule is finalized, the Clean Air Act requires MACT controls be installed on existing sources within three years, with the possibility of a one-year extension for specific sources under some limited circumstances. New

³ GAO, 2009, Mercury Control Technologies at Coal-Fired Power Plants Have Achieved Substantial Emissions Reductions GAO 10-47

sources must meet the standards when they begin operations. EPA intends to propose these standards for both new and existing coal- and oil-fired power plants by March 2011.

Since I testified before this subcommittee last year, we have revised the national ambient air quality standards (NAAQS) for nitrogen oxides, proposed to revise our SO₂ NAAQS, and proposed to strengthen the ozone NAAQS. As the law requires, EPA's NAAQS decisions are based on sound science and our obligation to protect public health. We anticipate promulgating a final SO₂ NAAQS by June and a final ozone NAAQS by August. The States are required through their state implementation plans or SIPs to meet the new NAAQS, and address interstate transport of pollution that contributes to downwind nonattainment or maintenance areas for these standards. On top of any federal requirements, these SIPs could well require additional emissions reductions from power plants over the next decade.

Closing

I am confident that whether it is through legislation like S. 2995 or the Clean Air Act regulations that EPA is developing, reductions in power plant pollution will drive smart investments in pollution control and energy efficiency, as well as in innovative generation technologies, all of which will pay back the American people in jobs, economic growth, better health, and environmental protection for years to come.

One of my top priorities at EPA is to work with you, with the power industry, with the states, with community groups and environmental groups, and with the full range of experts from government, business, and universities to find the right path forward in crafting the laws and regulations needed to protect human health and the environment. In closing, I would like to thank Senator Carper and other members of the committee for your strong leadership on these issues over the years. I am confident that we can make great strides to meet our shared environmental and economic goals.

Thank you. I look forward to answering your questions.

**Environment and Public Works Committee Hearing
March 4, 2010
Follow-Up Questions for Written Submission
Questions for McCarthy**

Senator Benjamin L. Cardin

Cardin 1. I understand that S. 2995 does not preclude EPA from setting a more stringent cap on NOx. Setting a standard in statute, however, might make it difficult for EPA to make an adjustment in either direction should new science support a change. Are there any examples where EPA has used its rulemaking authority to adjust a standard or limit for a regulated pollutant or industry?

Answer: EPA has the authority and the mandate under existing laws to review and adjust pollution standards or emission limits should new science support a change. For New Source Performance Standards (NSPS) and National Emission Standards for Hazardous Air Pollutants (NESHAP), for instance, EPA is required to periodically review the emission limits in light of advances in technology and improved understanding of the significance of emitted pollutants, adjusting the control requirements accordingly. EPA has exercised this authority for a number of different standards, such as electrical generating units, for which NSPS were first set in 1973 and revised subsequently several times since then to reflect increasingly efficient control technologies. EPA also regularly revises the NAAQS standards downwards to be more protective of public health and the environment as we learn more about the health and environmental effects of these pollutants. In 1998 EPA finalized the NOx SIP Call, which did include new limits on seasonal NOx emissions in eastern states that were not specifically required by Congress.

Cardin 2. I am pleased the Agency is reevaluating the federal Clean Air Interstate Rule.

-When does the Agency expect the new CAIR rule to be released?

-Does the science and analysis that the Agency has compiled to this point warrant a stricter annual NOx cap than is proposed in S. 2995?

-Has the Agency determined what the annual NOx cap will be under the new rule? If so, what will it be?

Answer: As EPA stated in its testimony for the March 4th hearing, we expect the rule to be proposed soon. The proposed rule has been submitted to OMB for review under Executive Order 12866, and therefore we are not in a position to describe the details of the proposal at this point. We will keep the Committee updated on the proposal, and will offer to brief the Committee when the proposed rule is signed.

Cardin 3. There are currently a large number of banked allowances for both SO₂ and NO_x programs. Given the large number of banked allowances, when would we see reductions in SO₂ and NO_x emissions under the cap levels outlined in S. 2995?

Answer: As you may know, on April 15, 2009, we received a request from Senator Carper to analyze S. 2995. The request included emission modeling results as well as estimates of air quality changes and the resulting human health benefits. When this analysis is complete we will be able to provide this information. Based on our past experience with cap and trade programs, it is likely that if S.2995 became law emission reductions and health benefits would begin very soon thereafter. However, depending on the banking provisions, the full cap levels would likely not be achieved until some time after the target years identified in the legislation.

Cardin 4. Has EPA analyzed the impact of the emission caps set in S. 2995 to determine whether the required emissions reductions would comply with the new and planned National Ambient Air Quality Standards (NAAQS) for ozone, particulate matter, nitrogen dioxide (NO₂) and sulfur dioxide (SO₂)?

Answer: EPA has not done that type of analysis. As mentioned in response to Question 3 above, the analysis for S.2995 is not complete. In addition, while we anticipate that S.2995 would provide some additional improvement in ozone and fine particle concentrations, we are not able to conduct air quality modeling that will allow us to predict air quality concentrations with enough precision to answer this question in the timeframe requested by Senator Carper. As discussed recently with committee staff, in our analysis we do intend to provide estimates of regional changes in fine particle and ozone concentrations that might result if S. 2995 were to become law.

Senator Sheldon Whitehouse

Whitehouse 1. Section 418(c)(2) of S. 2995 sets forth the number of annual SO₂ allowances that EPA would distribute for the years 2012 and beyond. Using 2007 heat input figures for electric generating units (EGUs) in the United States, please provide the average SO₂ emissions rate that would be required at EGUs at each of the three annual allowance levels.

Answer:

	2007	2012	2015	2018
SO ₂ (tons)	8,933,515	3,500,000	2,000,000	1,500,000
Heat Input (mmBtu)	27,744,770,440	27,744,770,440	27,744,770,440	27,744,770,440
SO ₂ Rate (lbs/mmBtu)	0.644	0.252	0.144	0.108

Whitehouse 2. Section 419(d)(3) of S. 2995 sets forth the number of annual allowances for NO_x in Zone 1 states, for the years 2012 and beyond. Using 2007 heat input figures for EGUs in Zone 1, please provide the average NO_x emissions rate that would be required at these EGUs at each of the three annual allowance levels.

Answer:

Zone 1	2007	2012	2015	2018
NO _x (tons)	2,556,599	1,390,000	1,300,000	1,300,000
Heat Input (mmBtu)	22,105,744,303	22,105,744,303	22,105,744,303	22,105,744,303
NO _x Rate (lbs/mmBtu)	0.231	0.126	0.118	0.118

Zone 2	2007	2012	2015	2018
NO _x (tons)	727,078	510,000	320,000	320,000
Heat Input (mmBtu)	5,639,026,137	5,639,026,137	5,639,026,137	5,639,026,137
NO _x Rate (lbs/mmBtu)	0.258	0.181	0.113	0.113

Whitehouse 3. What states currently require NO_x and SO₂ emissions rates from EGUs that are more stringent than the average rates you calculated in response to Questions 1 and 2? Based on current law, what states are scheduled to require NO_x and SO₂ emissions rates from EGUs that are more stringent than the average rates you calculated in response to Questions 1 and 2, in the years 2012 -2019?

Answer: EPA has compared state-by-state emissions rates for 2007 with SO₂ rates for 2012 calculated for Question 1 and NO_x rates for 2012 in Zone 1 and Zone 2 calculated for Question 2. These are the actual historical rates and are not based on an assessment of state requirements. The eighteen states that had 2007 historical rates below 2012 S.2995 rates for SO₂ and/or NO_x (as calculated in Questions 1 and 2) are indicated in the table below:

	SO ₂	NO _x
AZ	X	
CA	X	X
CO	X	
CT	X	X
ID	X	X
MA		X
ME	X	X
MT	X	
NH		X
NJ		X
NM	X	
NV	X	X
OR	X	X
RI	X	X
TX		X
UT	X	
VT	X	
WA	X	X

Whitehouse 4. What are the lowest NOx and SO2 emissions rates currently being achieved at EGUs in the United States? Where possible, please use 2007 heat input data in your calculations.

Answer: EPA's data indicates the lowest SO₂ rate for a coal EGU is 0.020 lbs/mmBtu and the lowest rate for NOx emissions at a coal EGU is 0.037 lbs/mmBtu. For SO₂, the units in the top 95th percentile have rates of 0.085 lbs/mmBtu or lower. For NOx, the best performing facilities in the 95th percentile were able to achieve emission rates of 0.106 lbs/mmBtu or lower.

Whitehouse 5. Based on your reading of S. 2995, do you believe EPA would have the authority to issue fewer NOx or SO2 allowances than the allowances set forth in S. 2995, before 2020?

Answer: EPA's reading of S.2995 is that the bill requires the Administrator to issue specified quantities of SO₂ allowances up through 2020, and only for 2021 and thereafter is the Administrator given discretion to issue fewer than the specified amount. Similarly, EPA's reading is that S.2995 requires the Administrator to issue specified quantities of annual NOx allowances up through 2019, and only for 2020 and thereafter is the Administrator given discretion to issue fewer than the specified amount. However, EPA's reading is that under S. 2995 the Administrator is given discretion to issue fewer than the specified amount of seasonal ozone season NOx allowances not later than January 1, 2020 and every five years thereafter.

Whitehouse 6. Based on the SO₂ caps set in the legislation, and based on the number of banked SO₂ allowances currently in existence, can EPA project the number of tons of SO₂ that will actually be emitted each year between 2012 and 2020 under S. 2995?

Answer: EPA would need to conduct modeling in order to provide emissions estimates under S. 2995, and EPA has received a request from Senator Carper to conduct such analysis. When this analysis is complete EPA will be able to provide this information.

Whitehouse 7. Do you read the legislation to require that the seasonal ozone caps authorized in Section 417(a)(3) be proportional to the annual cap for any given year? If not, what would prevent an EGU from running at a higher capacity factor in the off-season, without operating its NO_x pollution control equipment?

Answer: First, to clarify, we assume that the question is intended to refer to Section 417(b)(3). Section 417(b)(3) allows the Administrator to reduce the NO_x ozone season budgets if he or she determines that emissions should be further reduced to protect public health or the environment, to assist with attainment or maintenance of attainment, or to assist compliance with section 110(a)(2)(D). There is nothing that requires NO_x ozone season budgets to be "proportional," but the Administrator may make them "consistent" with NO_x annual budgets under Section 419.

Whitehouse 8. How cost effective (in dollars per ton of NO_x reduced) is it to reduce NO_x pollution from EGUs, versus other stationary and mobile sources?

Answer: Unlike SO₂, where EGUs are by far the largest source of emissions (representing more than 65% of total nationwide emissions) and continue to have many available emission reduction opportunities, the picture for NO_x is more complicated. For NO_x, EGUs are only one of many sources that emit NO_x (and represent around 20% of total nationwide NO_x emissions). Furthermore, many low cost NO_x reductions from EGUs have already been achieved through programs like the Acid Rain Program and the NO_x SIP Call. As EPA proceeds with efforts such as the CAIR Replacement rule and the reconsideration of the ozone NAAQS, we are doing additional work to evaluate the cost effectiveness of various NO_x reduction strategies.

Senator James M. Inhofe

Inhofe 1. Section 419(a) of S. 2995 includes a new definition of “affected unit” for purposes of the nitrogen oxide control and trading program. The definition defines affected units to include cogeneration units that serve as a generator with a nameplate capacity greater than 25 megawatts and produces electricity for sale.

– Please describe how this definition of cogeneration units differs from the current definition of cogeneration units under Section 402 of the Clean Air Act and EPA’s Clean Air Interstate Rule issued on March 10, 2005.

Answer: The definition and treatment of cogeneration units are different under Section 419(a) of S.2995, the Acid Rain Program under CAA Title IV, and the CAIR trading programs.

Under Section 419(a) of S.2995, cogeneration units do not receive different regulatory treatment than other types of electric generating units. “Cogeneration unit” and “cogeneration facility” are not defined. Any facility (including a cogeneration facility) that on or after January 1, 1985, serves a generator with nameplate capacity greater than 25 MWe and produces electricity for sale is subject to the regulatory requirements of the NOx program.

Under the Acid Rain Program (CAA Title IV), some cogeneration units receive different regulatory treatment than other types of electric generating units. The Acid Rain Program rules define “cogeneration unit” as a unit with equipment to produce electricity and useful thermal energy (e.g., steam for industrial processing) through sequential use of energy. The following categories of cogeneration units are exempt from the Acid Rain Program: (i) those that are qualifying facilities under the Public Utility Regulatory Policies Act (PURPA) and have fixed-price power purchase contracts for at least 15% of planned net capacity that were in place as of November 15, 1990 and continue to be in place without changes allowing for pass-through of Acid Rain Program compliance costs (CAA section 405(g)(6)(A) and 40 CFR 72.6(b)(5)); and (ii) those that sell to the grid an annual average amount (on a 3-year rolling average basis) of electricity less than or equal to 1/3 of their potential electrical output capacity or less than 25 MWe (i.e., 219,000 MWhr) (CAA section 402(17)(C) (definition of “utility unit”) and 40 CFR 72.6(b)(4)).

Under the CAIR trading programs, some cogeneration units -- but fewer than under CAA Title IV -- receive different regulatory treatment than other types of electric generating units. The CAIR trading program rules define “cogeneration unit” as a unit: (1) with equipment to produce electricity and useful thermal energy (e.g., steam for industrial processing) through sequential use of energy; and (2) meeting certain operational and efficiency standards. The following category of cogeneration units is exempt from the CAIR trading programs: those that sell to the grid an annual amount of electricity less than 1/3 of their potential electrical output capacity or less than 219,000 MWhr (40 CFR 97.104(b)(1)).

EPA has not performed a detailed analysis assessing the impact of S.2995 on cogeneration units.

- How many additional cogeneration units could be regulated as a result of the definition in S. 2995 as compared to the number of units regulated under the Clean Air Act or under the March 10, 2005 Clean Air Interstate Rule?
- What type of controls or increased costs would apply to cogeneration units that are covered by S. 2995?
- What impact would increased controls of cogeneration units have on their energy efficiency?
- Would increased regulation of cogeneration units as proposed under S. 2995 encourage or discourage the increased use of existing cogeneration units and the construction of new cogeneration units?
- Which industries in the U.S. currently use cogeneration units that could be impacted by the bill?
- What options for defining cogeneration units is EPA considering with regard to the Clean Air Transport Rule now under review at EPA?

Answer: The proposed rule has been submitted to OMB for review under Executive Order 12866, and, therefore, EPA is not in a position to state the specifics of what will be in the proposal. In response to a request from Senator Carper, EPA is currently working to develop an analysis of S.2995. When this analysis is complete we will be able to provide information related to the questions above.

Inhofe 2. Section 417(b)(3)(A) of the S.2995 includes a provision that would appear to provide EPA with new authority to revise downward “any ozone season nitrogen oxide budget for nonelectric generation units” if the Administrator determines that such reductions are needed to protect public health or the environment.

- Please list all ozone season nitrogen oxide budgets at the federal level or that are federally enforceable at the SIP level that could be impacted by this provision.

Answer: Section 417(b)(3)(A) allows the Administrator to reduce, for non-electric generating units, the NOx ozone season budgets implemented under the Clean Air Interstate Rule. State SIP revisions approved under CAIR that include such non-EGU NOx ozone season budgets are listed below.

Alabama, Connecticut, Indiana, Kentucky, Massachusetts, Michigan, Missouri, North Carolina, New York, Ohio, South Carolina, Tennessee, Virginia, and West Virginia have approved SIP revisions under CAIR that expand the applicability and budgets for the CAIR NOx ozone season trading program to include large industrial boilers and turbines and some small EGUs (serving generators with a nameplate capacity of 25 MW or less) and thereby cover all units that were subject to the NOx Budget Trading Program under the NOx SIP Call. These States chose to use this CAIR trading program to meet NOx SIP Call requirements with regard to these additional units. Under Section 417(b)(3)(A),

the Administrator would seem to have authority to reduce non-EGU budgets under this CAIR trading program for these States.

Delaware, Illinois, Maryland, New Jersey, Pennsylvania, Rhode Island and the District of Columbia also continue to have NOx SIP Call requirements, and budgets, for non-EGUs. However, these jurisdictions chose not to use the CAIR NOx ozone season program, and instead must use other mechanisms to meet the requirements. For these States, the SIP revisions addressing NOx SIP Call requirements with regard to non-EGUs are not submitted or approved under CAIR, thus, the Administrator would not seem to have authority under Section 417(b)(3)(A) to reduce non-EGU budgets for these States.

– What constraints are there, if any, on how low the Administrator could reduce the ozone season nitrogen oxide budgets under this proposed authority?

Answer: Section 417(b)(3)(A) allows the Administrator to reduce NOx ozone season budgets only after making certain findings, i.e., that emissions should be further reduced to protect public health or the environment, to assist with attainment or maintenance of attainment, or to assist compliance with section 110(a)(2)(D). This limitation could be viewed as limiting the purposes for which the Administrator may reduce such budgets and thus limiting the amount of any such reduction.

– Would this authority extend to new nitrogen oxide budgets if states incorporate them in revised State Implementation Plans?

Answer: Authority under Section 417(b)(3)(A) seems to cover new, state-adopted NOx ozone season budgets if they are included in state SIP revisions adopted and approved under the Clean Air Interstate Rule.

– What constraints are there in the legislation in what the Administrator could consider in determining whether additional reductions are needed to protect public health or the environment?

Answer: Section 417(b)(3)(A) allows the Administrator to reduce NOx ozone season budgets after making certain findings, i.e., that emissions should be further reduced to protect public health or environment, to assist with attainment or maintenance of attainment, or to assist compliance with section 110(a)(2)(D). This provision does not specify what the Administrator may consider in determining whether to require further reductions to protect public health or the environment.

– Does this provision increase or decrease regulatory certainty?

Answer: It is not clear whether the net effect of this provision is to increase or decrease regulatory uncertainty.

Inhofe 3. What effect would the legislation have on State's authority to submit 126 petitions? Would this enhance or decrease regulatory certainty for businesses?

Answer: Section 5 of the bill reads: “Nothing in this Act modifies or otherwise affects any authority or obligation set forth in the Clean Air Act, including sections 110(a)(2)(D), 112, and 126 of that Act.” In other words, the bill explicitly states that it does not modify Section 126.

Inhofe 4. Could sources that install controls to meet the legislation trigger New Source Review if those controls result in increased emissions? Please identify the types of additional controls that could result from the legislation that would trigger New Source Review. If CO₂ becomes subject to regulation, could controls that result in a parasitic energy loss but net increase in emissions of other pollutants trigger New Source Review?

Answer: For certain types of control devices, the device results in not only a decrease in emissions of the targeted pollutant, but it can also lead to an increase in emissions of another air pollutant. A common example of such a control device is a thermal incinerator, which forms NO_x as a collateral pollutant while reducing VOC emissions. However, EPA has refined this requirement in regulations so that only an increase in emissions that is determined to be significant would subject it to New Source Review (NSR) permitting. Furthermore, the Agency has previously attempted to exempt such changes from NSR by promulgating a “Pollution Control Project Exclusion”; however, the U.S. Court of Appeals for the D.C. Circuit invalidated the NSR exclusionary provision as inconsistent with the Clean Air Act. Accordingly, installation of pollution control equipment that results in an increase in emissions at an existing major stationary source triggers NSR requirements unless such an increase is below a regulatory-established “significance level,” assuming EPA has set one. Thus, it is conceivable that application of emission controls in response to the S.2995 legislation, or any other mandate, would trigger NSR requirements for another pollutant. However, in practice, EPA sees few sources that actually experience this situation, since sources generally attempt to avoid NSR by minimizing emissions of collateral pollutants from a control device within the physical configuration and operational standards of the device.

Inhofe 5. If CO₂ becomes subject to regulation, could controls that result in a parasitic energy loss trigger New Source Review due to increased CO₂ emissions?

Answer: It is highly unlikely. Once CO₂ becomes subject to regulation, emission controls proposed for existing major sources that result in a parasitic energy loss will be looked at for their increase in CO₂ emissions (resulting from the need to produce more energy to compensate for the energy loss). If the CO₂ emissions increase equals or exceeds the significance levels established in the final Tailoring Rule signed by EPA Administrator Jackson on May 13, 2010, then the CO₂ emissions may trigger NSR requirements, as described in the response to Senator Inhofe’s question #4, but that is highly unlikely since the significance levels established in the tailoring rule are 75,000 tpy if a major source is undergoing modification or 100,000 tpy if the source is newly constructing.

Inhofe 6. Cogeneration units firing commercial quality natural gas have virtually no SOx emissions. Would you support excluding all cogeneration units firing natural gas from the SO2 emission caps under S. 2995 as long as they burn commercial quality natural gas? Do you have the authority to provide a similar exemption under any Clean Air Transport Rule now under development?

Answer: EPA does not have a position on this issue in regards to S.2995. We are also not in a position to discuss the CAIR replacement proposal and any related questions about EPA's authority, e.g., to provide exemptions in the proposal. We will keep the Committee updated on the proposal, and will offer to brief the Committee when the proposed rule is signed.

Inhofe 7. Similarly, would you support an exemption from a NOx trading program for cogeneration units that employ Selective Catalytic Reduction (SCR) technology? Wouldn't such an exemption encourage units to install SCR when possible?

Answer: EPA does not have a position on this issue in regards to S.2995.

Inhofe 8. What effect would S. 2995 (or regulation that achieves the same goals of as this legislation) have on increasing the magnitude of the coal ash requiring disposal? Please provide the committee with estimates of the increase in coal ash and the disposal cost estimates if the ash must be disposed of in a subtitle C equivalent disposal facility.

Answer: At this time, it is not possible to predict the effect this legislation would have on the amount of coal ash being sent for disposal. However, the agency takes issues of disposal capacity seriously and intends to carefully consider the issue when developing regulations that might affect the volume of coal ash.

Inhofe 9. How much of existing coal ash is reused in this country? If regulations under development have the effect of stopping the reuse of coal ash what effect would this have on costs?

Answer: Coal ash "re-use" is usually referred to as "beneficial use" by EPA. Based on the most current year (2008) annual tonnage coal ash beneficial use data available from the American Coal Ash Association's website: <http://acaa.affiniscape.com/displaycommon.cfm?an=1&subarticlenbr=3>, 50.1 million tons per year are beneficially used and an additional 10.5 million tons per year are used for mining applications.

EPA analyzed the potential costs and benefits in the proposed coal combustion residuals rule in the Regulatory Impact Analysis (RIA). The RIA can be accessed at <http://www.regulations.gov> by opening docket item EPA-HQ-RCRA-2009-0640-0003.

Inhofe 10. Is there sufficient RCRA subtitle C disposal capacity in this country to handle all of the coal ash, including the increased coal ash that will be produced under S. 2995?

Answer: At this time, it is not possible to predict the effect this legislation would have on the amount of coal ash being sent for disposal. Regarding disposal capacity, EPA's proposed rule on coal combustion residuals (which was published in the Federal Register on June 21, 2010), co-proposed two major options--an option based on the authorities available under subtitle C of RCRA, which creates a comprehensive program of federally enforceable requirements for waste management and disposal, and an option that establishes national minimum criteria for the disposal of coal combustion residuals under subtitle D of RCRA, which would be enforced primarily through citizen suits. The Agency decided to take this approach as the most effective means of providing the public with critical information and requesting comment on each proposal.

With respect to disposal capacity under the subtitle C option of RCRA, EPA recognizes the concerns that have been brought to our attention about the potential effect that regulating CCRs under subtitle C may have on disposal capacity and we have a thorough discussion of the capacity issue in our proposed CCR rule. However, under RCRA subtitle C, facilities that begin to receive newly listed wastes are eligible for "interim status" which means that by fulfilling certain requirements, they can continue to operate until they are fully permitted under RCRA subtitle C regulations. We believe that most existing landfills will be able to meet the subtitle C requirements. Thus, most landfills should be able to continue to operate under the subtitle C regulations. Therefore, in looking at disposal capacity, one must look not only at the existing commercial hazardous waste landfill disposal capacity (which is between 23.5 and 30.3 million tons), but must also consider new disposal capacity if the Agency decides to regulate coal combustion residuals under subtitle C of RCRA. However, even if new capacity is needed, implementation of a subtitle C alternative will take place over a number of years, providing time for industry and state permitting authorities to address the issue. Further, because regulation under subtitle C would make disposal more costly, and because the beneficial use of CCRs would retain the statutory Bevill exemption, it is likely that the beneficial use of CCRs will increase, thus reducing the disposal of CCRs.

Inhofe 11. EPA is scheduled to release a new NESHAP for industrial boilers. Please provide an estimate of the potential amount of increased scrubbing and coal ash that could be produced as a result of this rule? Please provide information on the number and type of boilers that would be required to install controls or monitor under the Agency's proposed rule and the likely capital and annual costs.

Answer: The Administrator signed the proposed new standards for industrial boilers on April 29, 2010, and they will soon be published in the Federal Register. It is important to note that the notices propose national emission standards and do not mandate the use of a particular type of control equipment or other technology. For the purpose of estimating the impacts of the proposed rules, we assumed that affected sources would elect to use the technologies on which the standards were based, although they

remain free to employ other approaches that achieve equal or greater control of emissions.

As explained in the notice, which can be viewed at <http://www.epa.gov/airquality/combustion/actions.html>, we estimated that the proposed rules will result in additional solid waste (fly ash) from coal-fired units of about 53,300 tons per year due to the installation of fabric filters and electrostatic precipitators to comply with the proposed particulate matter (PM) and mercury emission limits. We also estimated that the proposed rules will result in an additional scrubber effluent from coal-fired units of about 2.3 billion gallons per year. The proposed standards will cover 196,226 boilers and process heaters. Of these, 4,288 are coal-fired, 11,378 are biomass-fired, 168,829 are liquid fuel-fired, and 11,731 are gas-fired.

The estimated total capital cost of the proposed rules is \$11.3 billion. The total annualized cost is estimated to be \$3.6 billion, with testing and monitoring accounting for \$230.4 million of the total. About 350 boilers (coal, biomass, and heavy oil units greater than 250 million Btu per hour in size) will be required to install and operate PM continuous emission monitoring system (CEMS), and about 640 boilers (coal, biomass, and oil units greater than 100 million Btu per hour in size) will be required to install and operate carbon monoxide CEMS.

Senator David Vitter

Vitter 1. Under your interpretation of the Regulatory Flexibility Act what is EPA required to do before moving forward with new regulations that could impact small businesses?

Answer: EPA is mindful of the potential impacts of its regulations on small businesses and frequently consults with and receives comments from small businesses and their representatives during the rulemaking process. The RFA requires EPA to undertake specific additional analyses in certain circumstances and EPA will comply with all Regulatory Flexibility Act requirements as we prepare our proposed Transport rule. More specifically, the RFA requires EPA to undertake extra analyses for rules that might have a significant impact on a substantial number of small entities (SISNOSE). These analyses include Regulatory Flexibility Analyses that consider the potential impacts of rules on small entities and, in some cases, Small Business Advocacy Review (SBAR) panels. Thus, for each rule that is subject to the RFA, EPA must either certify that rule will not have a significant impact on a substantial number of small entities (SISNOSE), or complete such analyses.

Vitter 2. Under your interpretation of the Data Quality Act what is EPA's responsibility in ensuring that its regulations are based on unbiased science?

Answer: Consistent with the Office of Management and Budget government-wide guidelines that provide policy and procedural advice to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information disseminated by Federal agencies, EPA has issued agency specific EPA guidelines for ensuring and maximizing the quality, objectivity, utility, and integrity of information disseminated by the Environmental Protection Agency. This guidance, released in October 2002 and entitled "Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility, and Integrity, of Information Disseminated by the Environmental Protection Agency" (EPA/260R-02-008) is available on the web at:
http://www.epa.gov/quality/informationguidelines/documents/EPA_InfoQualityGuidelines.pdf.

EPA is committed to ensuring that the principles outlined in the EPA guidelines are followed.

Vitter 3. Please discuss Section 321(a) of the Clean Air Act and your understanding of why it has traditionally been ignored by the Agency?

Answer: On October 26, 2009, EPA provided a response to you on Section 321(a) of the Clean Air Act in which we discussed how the Agency has traditionally interpreted this section.

Senator CARPER. Thank you so much for your testimony and for your service.

I am going to go later in the questioning. But Senator Udall was good enough to join us, and he has another obligation to meet, so I am just going to give my time to him, and I will ask questions later.

Senator UDALL. Thank you very much, Senator Carper. I really appreciate that.

Senator CARPER. You are welcome.

Senator UDALL. Administrator McCarthy, you mentioned the fact that you like to fish and eat fish from the waters out in Massachusetts. In my old jobs, before I was in elected office, I liked to fish also.

One of the things I found the most disturbing in New Mexico is I think today almost all of our streams are polluted with a level of mercury that you cannot eat the fish. And there are warnings out for pregnant women and other vulnerable populations on that. It really hits people in New Mexico when they read that, that all of their streams are polluted with a level of mercury that you cannot eat the fish except in very small amounts.

So, I want to try to focus on the impact on the West, and my first question is, you know, the Bush administration's Clean Air Interstate Rule primarily affected eastern States, which are downwind from multiple coal plants in the Midwest. And as we know, the Federal courts have required EPA to start over and come up with a better rule.

How is the Obama administration's response to the court ruling likely to affect the West, and what other EPA efforts are underway to reduce pollution from coal-fired power plants in the West?

Ms. MCCARTHY. Senator, I appreciate your questions, and I sympathize and empathize with you about freshwater fish. I can remember getting into this business decades ago when fish advisories were almost unknown. And now they are everywhere. So, it is a challenge for all of us.

I will tell you that the Clean Air Interstate Rule is still in development. We are looking at the number of States that need to be involved in that rulemaking in order to address the transport of these long range pollutants. It does primarily focus on the eastern States. It is not the only effort that EPA will have underway to address these issues.

In particular, relative to the question of mercury we are also in the development stages, and we have put out some information requests to the power sector to look at a new utility MACT, which will be a maximum achievable control technology rulemaking process that we will begin in early 2011 and hope to complete by November 2011, that will address what kind of technologies are available, are cost effective, that can be required for the utility sector across the country.

But you are quite right that our efforts under CAIR have been mainly focused on the eastern part of the United States. But the proposal before you and the Senate bill S. 2995 would be a national program, getting at all 48 States plus D.C.

Senator UDALL. Thank you for that answer.

Now, changing direction a little bit here in terms of asking you about natural gas. Recently we have learned that the U.S. has very large supplies of natural gas, and thanks to recent discoveries of shale gas, deep shale gas, some energy analysts now estimate we have more natural gas than we do coal.

How do natural gas power plants compare with coal-fired plants for the purposes of these three pollutants we are talking about today, and is the EPA encouraged about these recent trends in natural gas supplies?

Ms. MCCARTHY. Thank you, Senator. I see the same information that you do, which is, it is very encouraging to see that there is so much natural gas available so that we can have the fuel diversity that I think most people are looking to have in our fuel supply.

Natural gas units tend to be the units that run the cleanest for the types of pollutants that we are talking about today. As you know, EPA, when it set standards for utility MACT and other standards, we actually look at the units in terms of what fuels they burn and what types of technologies are available for those types of fuels so that we can achieve the kind of reductions that we all hope to achieve.

They certainly do have a better profile. I think efforts that are underway here, and that we have by regulation, will attempt to bring down the emissions from other fossil fuel units from oil and from coal units, provide them the ability to upgrade, provide them the certainty they need to know what kinds of reductions we are hoping to achieve, because our goal is to bring down the emissions profiles of all units.

And obviously we are interested in how the market is looking at natural gas, what that means for the energy market in terms of what is competitive moving forward, and allow the market to make some of those critical decisions.

Senator UDALL. Thank you, Administrator McCarthy, and I look forward to working with Senator Alexander and Senator Voinovich and you, Mr. Chairman, and Senator Cardin, on these important issues. Thank you.

Senator CARPER. It will be our pleasure.

Senator UDALL. And thank you for your courtesies, too.

Senator CARPER. My pleasure. Thanks for joining us.

Senator Voinovich.

Senator VOINOVICH. Do you think that it makes sense to pass 3-P legislation with strict targets and timetables while at the same time leaving in place many of the clean air regulations that will be imposed on power plants over the next decade? Should it not be a tradeoff? That is, if you are going to force tough reductions, should that not be accompanied with some certainty and flexibility in how plants make those reductions?

Ms. MCCARTHY. Senator, I think that I share your goal to try to do my best to provide certainty so that investments that are being made in clean energy, whether it is cleaning the existing fleet or making decisions about what to invest in moving forward, are done with sound foresight. I think we are attempting to do that in the regulatory structure as best we can, and I am certain that is one of the reasons why the Congress is looking at this bill closely.

We are happy to work with you to see how we can align those efforts. I will say that EPA is under obligation to look at the full suite of hazardous air pollutants under its utility MACT standard, not just look at mercury as a specific toxic. So, we do have, certainly, a broader agenda for us in the regulatory front and we are hoping to, in concert with what you do in Congress, work together to provide certainty that you are looking to achieve.

Senator VOINOVICH. Well, I would think that that kind of commitment, as far as it can go, would make a big difference because, if I am going to come up with a new regime, I would like to know that is the regime and I am not going to have to be confronted with something next year or the year after in terms of what I am doing so that I can make my investments without worrying about, you know, making another 1, 2, or 3 years in the future.

In your statement you reference an economic analysis of a previous version of the Carper 3-P proposal. I note that this analysis was not performed on this bill and did not look at the costs that electricity customers would incur as a result of a 90 percent mercury control requirement.

And I remember the debate quite well in 2005 when Senator Lieberman and others tried to come forward with a new standard for mercury, and at the time the Energy Information Administration projected the cost for a 90 percent max standard as high as \$358 billion with an average increase in national electricity prices of 20 percent. That was a big issue then. The additional reduction in U.S. mercury disposition was projected to be just about 2 percent, an almost immeasurable decline in people's exposure to mercury.

I understand that the cost of technology has decreased since that time, but the potential economic impacts warrant evaluation, and I would like you to be aware that this is something that I would like to see if, and we are going to have a request to your office on this, and I think we are also going to be asking the Energy Information Administration to do the same thing.

It is the cost and benefit. If you go to 90 percent, how much are you going to better the reduction of mercury in terms of human health, so we can capture that. So often, what we have found is that you will take it to maybe 90 percent and then 80 percent, and then you go the next 10 percent, and what is the real benefit that you are getting in terms of improving health? This calculation is very important. Have you looked at that recently, in terms of the costs?

Ms. MCCARTHY. We have not revisited this issue specifically since we took a look at last year's bill. We did look at scenarios that were very similar to the targets that you are trying to achieve in the time line. So, we do think that, while there is not certainty, there is still a sense that the costs associated with this would be in the 1.5 to 2.5 percent increase over the course of between when the bill starts and 2025, which remains pretty minimal.

I will tell you, however, Senator, that the Administrator has already pledged our full support and our technical assistance to relook at these issues. I understand that costs will be a major consideration, and to the extent that we can provide technical assistance and work with staff to provide you additional information and re-

look at those issues, we will do that to the extent that our resources allow.

Senator VOINOVICH. I appreciate it. We talked about the concept of a lot of natural gas out there. But from my recollection, to go from coal to natural gas is a very expensive proposition.

The other aspect of that is that we have to take these all under consideration with CO₂ emissions, and if you move off from coal and you do not get the technology, then you go to natural gas which is about half the emissions for greenhouse gases. And all of these things work together.

It is very interesting that with the commercial technology that is available today to deal with greenhouse gases, it takes about, it would take about one-third of a plant's electricity to deal with the greenhouse gases. So, you would reduce that by one-third, and then you would have to provide other energy to make up the one-third, which means you would have to replicate, if you are burning coal and other coal facility, to make up for the loss of energy that you have incurred as a result of bringing down the greenhouse gases.

So, I think this is one thing, Senator Carper, that we, you know, look at in terms of how this is all going to fit together.

Thank you.

Senator CARPER. Thank you.

I am going to go ahead and ask my questions now and then yield to Senator Alexander next.

And welcome to Senator Cardin. Thank you for being here.

Just to follow up on what Senator Voinovich was saying, one of the virtues of a trading system and using market, the highest market forces, to enable us to ratchet down emissions is we give flexibility, in this case to the utilities. And if it makes sense to convert to what is now more readily available natural gas, they could do that. If it makes economic sense for them to change the technology out in their plants, they can do that.

I think that the idea is that we are not going to stipulate what to do. It is not one size fits all. One size does not fit all. But we will let market forces help guide that. And innovation as well.

One of the virtues of having to set some targets out there, to say these are our mission's targets, is it provides, we hope, the kind of certainty that we are looking for. It says to the technologists that are really smart people, including some folks in our audience and one of the witnesses in the next panel, it says, look, there is going to be a market. You spend the time and the money inventing this technology, there will be a market for it. And that is an important signal to send as well.

I want to come back, in terms of certainty, to a point made by Senator Voinovich, and it is going to be raised later on in our panel today, in our second panel, by our representative from AP; I think it is Mr. McManus. The question is on certainty. We say, for example, in our legislation, we want to see mercury emissions reduced by 90 percent by a date certain. We will allow EPA to go beyond that.

And Senator Voinovich says—and rightly so—well, that is the not the kind of certainty that he is looking for and maybe that AP is looking for. And I understand that there is a reason why EPA

asked for that kind of flexibility. But it tends to infringe maybe on the flexibility, or the certainty if you will, of the utilities themselves.

Would you talk with us a little bit about one and how we balance one against the other, please?

Ms. MCCARTHY. I think, Senator, in our individual rulemaking, as well as our rules that impact sectors and have to work together, we have to look at the appropriate balance. I think in terms of mercury technologies and the challenges moving forward that we have seen tremendous change in our ability to be able to address mercury and be certain about the reductions that can be achieved using the newly developed technologies and assessing those appropriately for each facility.

We will always struggle with that. The difficulty that we have is providing certainty on the basis of today's science and today's technology is one thing. Freezing that and thinking that science will not develop, we will not have better understanding of both the long-term transport questions as well as the localized impacts of some of these toxics is trying to freeze that in time or just rely on current technology or not look at what is coming up in trying to provide incentives for innovation. I think that is a mistake.

I think that the Clean Air Act readily acknowledged that the science does change. We learn more; technology does provide opportunities for cost effective actions to reduce toxics. And we know well that there are localized impacts associated with some of these pollutants that we are asking the States to address, not just the long-term transport in national standards.

So, a market based approach can work very well. We can try to coordinate with that and provide certainty for any additional actions that States or that EPA made may have to take to address localized impacts.

Senator CARPER. OK. Thank you.

In the latter part of your testimony, I jotted down—I tried to jot down what you said; you were talking about the plan of the EPA to go down your regulatory road to write a follow up rule to CAIR and our effort to try to find a legislative path forward. I think what you said is our efforts—EPA and our legislative efforts—our efforts will be mutually reinforcing in cleaning up our air, which is very encouraging to me.

Would you just talk about that a little bit more, please?

Ms. MCCARTHY. Senator, I think that EPA is obligated by the courts and under the Clean Air Act to move forward to develop certain regulatory standards in a timely way. We are going to meet that obligation. We are going to try to do quite a bit than we have over the past few years at developing regulations that will stand the test of time legally.

What we are seeing in the bill that you are contemplating is moving in exactly the same direction as our regulations would move. To the extent that we can align those efforts, that we can inform you about what we are seeing through our regulatory development process and the data that we are gathering to define these standards, it can inform what you think is available and readily available that you should move through your legislation. It will also inform us in our regulatory efforts.

I think we are totally aligned in terms of the direction we are taking. We very much appreciate the standards and the time lines that you have set. We can adjust those moving forward and inform what one another does. And the United States works best when Congress does its thing and we follow the law and do ours as well. And I think we can align very well.

Senator CARPER. All right. Thank you.

Senator ALEXANDER.

Senator ALEXANDER. Thanks, Mr. Chairman.

Administrator McCarthy, you are developing a mercury rule now, which, if we pass this law, the law would replace that, right?

Ms. MCCARTHY. Senator, we are actually going through data gathering to develop a utility MACT standard which actually covers many more toxics than mercury. So, even if you move forward, we still have the regulatory requirement under the existing Clean Air Act to look beyond mercury and to do that in a way that meets the letter of the law.

Senator ALEXANDER. You are not planning to have a trading system for mercury, are you?

Ms. MCCARTHY. Actually, we do not believe that trading for toxic pollutants is an inappropriate design for a rule moving forward, and the courts have spoken to that issue as well.

Senator ALEXANDER. Do you have evidence that mercury from power plants settles near the power plant?

Ms. MCCARTHY. There is evidence of local impacts that is scientifically credible and has been peer reviewed, yes.

Senator ALEXANDER. Senator Voinovich was asking about further estimates by EPA of the costs, which I am very interested in as well. How long would it take to do that?

Ms. MCCARTHY. I think, Senator, we need to have a good discussion with your staff to figure out exactly how detailed an analysis we need. We certainly will be sensitive to your time constraints and try to do that in as timely a way as we can.

Senator ALEXANDER. Yes, a lot of us would like to get on with the legislation, and we want to know what it costs before we do. So, that would be a big help if you could give a priority to that because, even those of us who are—maybe those of us who are proposing the legislation especially want to make sure we have a good understanding of the costs.

The preliminary costs suggest, based upon EPA, well, the EPA analysis so far, shows that rates will rise between about 1.5 and 2.5 percent by 2025 as a result of the SO_x and NO_x requirements. That is about \$2 or \$3 a month. Is that right?

Ms. MCCARTHY. That is accurate. Based on the analysis that we did—

Senator ALEXANDER. Now, in saying that, is that just actual costs, or do you balance that against other benefits and include those benefits in your analysis?

Ms. MCCARTHY. That is the actual cost.

Senator ALEXANDER. That is just the actual cost?

Ms. MCCARTHY. Retail cost, yes.

Senator ALEXANDER. And then on mercury, Senator Voinovich was asking about that and acknowledging that there has been some improvement in the technology based upon what we can see

from the General Accounting Office. TVA customers in our region would expect an increase in rates of 13 cents to 33 cents per month over 15 years. So, do you have any analysis of what the separate mercury requirements would cost?

Ms. MCCARTHY. I do not at this point, Senator.

Senator ALEXANDER. What about the—are you familiar with any studies that, and this may be more appropriate for the next panel, that reflect on how rules such as the one we are proposing would impact on the efficiency of coal plants? In other words, whether a plant would have to reduce its efficiency in order to meet the rules.

Ms. MCCARTHY. That is a good question, Senator. I am not sure that I am able to answer it. I can tell you that when we are looking at the impact of the Clean Air Interstate Rule we are relying on a few things. One is the ability for some of the existing plants to increase their heat rates, which we think they have an ability to do. We are also relying a great deal on continued investment in energy efficiency overall, which impacts demand and can help us stay within those caps.

Senator ALEXANDER. Do you think it provides sufficient certainty to utilities to just leave it to the EPA after 2020 to decide what the rules should be, the standards should be?

Ms. MCCARTHY. Senator, I think the best we can do is make our rules on the basis on what we know now about the science and technology and costs and do that as far out as we feel comfortable doing. I do not think we can really be expected to do more than that. The science does change. The capacity to be able to bring cost effective solutions to the table changes.

And so we will do our best to provide certainty over time as you are attempting to do with this legislation. But looking beyond a 2025 time horizon may not be something that we feel comfortable doing on the basis of information that we have.

Senator ALEXANDER. Well, my major request to you, and I said this to the Administrator yesterday, is that you put a very high priority on doing whatever EPA can do to help Senator Carper, Senator Voinovich, any of us to understand the actual cost of the proposed rules on electric rates.

I mean, if it is \$2 to \$3 a month by 2025, you know, that is one thing. If it is \$20 to \$25 a month, that is another thing. And if it is, my own view is that I want the coal plants to operate, but they just should not be operating without strong rules on SO_x, NO_x and mercury. And if we can do it at \$2 or \$3 a month by 2025, we ought to get on with it.

Thank you, Mr. Chairman.

Ms. MCCARTHY. Thank you, Senator.

Senator CARPER. Senator Alexander, is that your first round? OK.

Senator Cardin, thanks for joining us.

Senator CARDIN. Well, Mr. Chairman, Senator Carper, I want to really thank you for your extraordinary leadership on the subject. You have been tenacious in keeping us focused on dealing with these pollutants, and I thank you.

I think there is not a member of our Committee who has not had the opportunity to talk with you directly about this issue. And you

have brought together Democrats and Republicans in an effort to deal with these important areas.

So, I just first want to thank you very much and let you know how much I appreciate my neighbor, Delaware, providing the leadership because, as you know, we are all in this together.

Airborne pollutants do not stick to the geographic area in which they are located. In fact, the quality of air in our entire region, mercury reductions are critically important to all of us. We have the Chesapeake Bay. We know of fish advisories that have been given because of the high levels of mercury content. It is an extremely important issue for us to do a much more effective job.

On sulfur dioxide, we know the impact that acid rain has on plants in our community, the impact that it is having on the Bay, the impact that it is having on our environment. With the NO_x , it clearly is affecting air quality, respiratory issues, and I can go through the list and list them. And it is for that reason the Maryland legislature and other States have taken action on this issue when we enacted the Healthy Air Act in July 2007.

I mention that because I know that there was a lot of concern when the Maryland legislature enacted this, and Maryland implemented it because there was a concern as to whether we could reach the type of standards that were applied at the State level.

The State has moved forward aggressively, and quite frankly with minimal problems in dealing with the reductions in all three of these pollutants. Clearly, with mercury and sulfur dioxide, the limits in Chairman Carper's bill complement what we have done in Maryland, and I find it very, very helpful that we have national policies established by Congress in this area.

I also find that true with NO_x , although I must tell you I would hope that we could be more aggressive on the limits on NO_x . I think we could be more. I think the Maryland experience has shown us that we could be more aggressive in that area, and I hope, Mr. Chairman, we can work together to take a look at that particular issue.

I guess this discussion, Administrator McCarthy, I find very helpful. I mean, when you are trying to answer the cost issues, it is difficult because we do not know what is going to happen with energy efficiencies, we do not know what is going to happen with alternative fuels, we do not know what is going to happen as far as the mix in this country is concerned, which obviously affects the cost issues when you are trying to reduce airborne pollutants.

If the sources are no longer used as frequently because of an energy policy, that is going to have a dramatic positive impact on the cost issues. And we all hope that we are going to enact an energy policy for this country that is going to make us less dependent upon fossil fuels and that should make your, all of our jobs a lot easier and less costly to the consumer. And that is what we are all fighting for.

I want to sort of engage you in a discussion as to how Congress, working with EPA, can do this most effectively. You point out, and rightly so, you have a responsibility to act, you are acting, you are going to act, as you are required to under the Clean Air Act. Congress has responsibilities, and I think Senator Carper is right in pursuing legislation here to deal with these three pollutants.

How do we complement each other as we go forward in this so that we certainly allow you to do what is necessary from a regulatory view under existing law, but then we come in and complement what you are doing through the efforts of legislation that our Chairman has proposed?

Ms. MCCARTHY. Senator, you ask a very good question, and I think one of the most basic things that we can do together is to share information and to answer the questions that you are asking about what it means for Maryland and what it means for other States moving forward if Congress takes this action. What kind of time line should we be looking at? What emissions reductions are necessary?

One of the challenges that the court told us when we do the rewrite of the Clean Air Interstate Rule was we had to be certain and provide data to show that the reductions we were achieving through that program needed to ensure that no upwind State was emitting pollution across its boundaries in a way that would significantly prevent a downwind State from achieving or maintaining attainment with the Clean Air Act standards.

And so it challenged us to go to a different level and a more detailed level of data gathering and analysis that when the Clean Air Interstate Rule is ready to come out, and we are hoping in a very short period of time that we will be able to share that information and we will be able to inform one another's discussion about how well to move forward.

Now let me, if I could, just for another minute, just say that the other thing that we can do is to really look at history and what that has shown us about market programs like the Acid Rain Program and what did a market based approach do to help us achieve pollution reductions in a cost effective way.

And I think one of the things we learned is that the certainty question is an interesting one because, back when the Acid Rain Program was beginning, in 1990, we estimated that the cost would be \$8 billion a year. In 2004 the actual cost was \$2 billion a year. And that program has achieved benefits at a cost ratio of benefits to cost at a ratio of 40 to 1. It has been enormously successful. We did not even anticipate that right, never mind the over-caution on the part of industry about what it might cost.

So, what we have learned is, the certainty question is something that you really cannot get right if you are predicting that far into the future. You need to understand that the innovation is there. The business models, the markets will grow, if you send the right signals.

And the other issue with certainty is that, frankly, there is very little certainty now. There have been too many laws that have been remanded and vacated; there are too many laws that people are waiting with bated breath to see how they are going to look. And we have an obligation on the part of EPA to be as quick and as forthright as we can in sort of laying out that regulatory pathway. But there is no certainty right now. The utility companies are having difficulty getting permits to do major modifications and to site new facilities because of this uncertainty.

And so we should not worry too much about whether it is going to be certain 20 years from now as much as acknowledge that we

have uncertainty now that is impacting the market, that is preventing us from making the transition to a clean energy future, that this bill, and through regulation, we can try to provide a much more balanced approach and much more certainty moving forward.

Senator CARDIN. I think that was an excellent answer. I appreciate that very much. I really do think that Senator Carper's bill helps us in moving forward on the predictability you mentioned in regards to the three pollutants.

But I tell you, and I think we are working together, but if we want to give the maximum predictability then we should get an energy policy enacted in dealing with the global climate change issues because then you really have, I would suggest, a much broader area of predictability to allow the market forces to really work for the desired results.

But I think your answer as to the need for us working with EPA, Congress together, to give the community a stronger direction, is well taken, and I thank you for your reply.

Senator CARPER. Senator Cardin, thank you for your questions, and thank you for your very kind words. I appreciate the nice things that you said about my involvement in these issues. I would just—I do not think you were here when we said this, but Senator Voinovich and I worked on this for, I think, for about 4 years during the first part of the Bush administration and for a long time and since then, Senator Alexander has been very much—

Senator CARDIN. I know Senator Voinovich's work and Senator Alexander's work in this area, and it just points out again how Senator Voinovich is going to be missed after this year. He has been an incredibly valuable member of the Committee. I certainly want that to be reflected in my comments.

Senator CARPER. All right. I think that there are not many things that we agree on, but that would be one of them. So, thank you for that.

Senator Voinovich.

Senator VOINOVICH. I just want to comment, as a Governor, I dealt with this all the time. In fact, when I became Governor, we were not compliant with the national ambient air standards, and the first thing was to try and get us into compliance because we had businesses that would just fly over the State and say I do not want to be in that area.

So, in Senator Carper's example, you used Tennessee and said that if we were able to do this, the air would be cleaner, and as a result of that the businesses would have less expense because of the fact that they would not have to put on various types of gizmos to keep their emissions down. And so you have to take that and weigh the costs of reducing NO_x, SO_x and mercury and then just see how that folds into the cost of energy.

This is a reality. If you have a situation like my State, and the ambient air is down because the economy stinks, but if the economy comes back, a lot of these businesses are going to look at what their costs are in terms of, their energy costs, and they will conclude, as one company before we complied with the ambient air standards, Cooper Tile, and I will never forget it, they were going to move. But then we go that worked out, and they stayed, and they expanded.

But you will see the movement of businesses to other parts of the country where they do not have the problem. So, this is a delicate balance, and probably I think more about some of these issues than say Senator Carper and some of the other Senators because we are a manufacturing State. And one of the reasons why we are a manufacturing State is we have cheap energy.

So, that is where I am at right now, that is why this cost is very, very important to me. How is going to play out? And I am not—I am well aware of the health benefits that are here, and sometimes I do not mention them enough. But how do we put this together so that we can do the health and at the same time do not kill the goose that laid the golden egg in a place like my State with, you know, 10.4 percent unemployment. And we want to come back.

Senator CARPER. Thank you.

Did you want to kind of respond to anything that Senator Voinovich has said?

Ms. MCCARTHY. I guess, Senator, I just wanted to agree with you. I mean, I think we are focusing equally, and certainly on the cost and benefits associated with our rules. We are looking at the economy as well and looking at energy prices. We know the economy is difficult right now, and we want to be able to make the improvement in air quality.

But we certainly want to do it in a way that creates jobs in a way that enhances the economy and then provides a much more level playing field across the Nation so that the kind of changes that you worry about, the relocations, do not happen. Certainly we want to grow our manufacturing base here in the United States.

The only thing I will mention is that I think the President has been pretty eloquent at talking about clean energy as a transition, as an approach that moves toward clean energy and brings in renewables and looks at efficiency. But he has also recognized that that is a transition that we need to accommodate and that coal will be a piece of that transition strategy. I mean, it will challenge us, but it is an issue that he is putting on our plate.

Now, he has recently brought together a task force for carbon capture and sequestration. He understands that we need to provide some assistance here, some regulatory certainty on that pathway as well. But it is a balance, and it is one that we will be most sensitive to.

Senator VOINOVICH. Well, the issue is where is our economy, and how long is it going to take us to get out from under where we are today. And you know, I think I have talked to you, and I have written to Carol Browner twice on another matter, but it is the cost of the combined sewer overflows in the water area.

I have communities in my States, 100 of them, and a 13 percent increase in their water and sewer rates, 13 percent this year, 13 percent next year. And there is not any kind of sensitivity. Some of them, they have had businesses that have closed, and so the cost of that is now coming down on the folks that remain in the community.

And there seems to be—I think we need to have some consideration given into all of this. It may be, frankly, to move the date down 1 or 2 years to realize that we are going through this situa-

tion. We cannot just deal with things and close our eyes to what is going on in terms of the people that are out there in our country today that are really hurting.

Ms. MCCARTHY. The only other thing I will assure you, Senator, as we are going through our rulemaking process, we will ask those questions. We will fully explore where the technologies are available, whether they are cost effective, how quickly can we anticipate making the kind the shifts and reductions that we are hoping to achieve. And we will make our decisions with our eyes wide open, both in terms of the environmental benefits but also in terms of the costs associated with any strategy that we move forward with.

Senator VOINOVICH. Thank you.

Senator CARPER. I have just a couple of questions to follow up. Earlier in your testimony I think you mentioned a couple of figures that I thought were striking. And a question that relates to what Senator Voinovich is getting to, how do we strengthen our mission standards, how to reduce the emissions of unhealthy substances into our air, and at the same time not impede our economic growth? You cited a statistic. I think it was since 1990 maybe. Can you just go back and say that again? I thought that was an especially pertinent point.

Ms. MCCARTHY. We talked about GNP, right?

Senator CARPER. Yes, or GDP. You talked about emissions were down by so much, and GDP was up by a remarkable amount.

Ms. MCCARTHY. Basically, the economy can grow, obviously, while we clean up the air. Overall pollution emissions have been reduced by 54 percent since 1980. At the same time, U.S. GDP, when it is adjusted for inflation, has increased 126 percent.

Senator CARPER. You say adjusted for inflation?

Ms. MCCARTHY. Yes.

Senator CARPER. Well, that is good. That is a pretty striking point.

Another point I want to come back to, one of the burdens that businesses carry in this country, particularly compared to other nations with whom we compete, is the cost of healthcare. I was struck by a number on one of charts that we went through earlier where we actually could reduce our healthcare costs in this country by about \$2 trillion over the next 15 years.

And I said earlier the cost of the Senate passed healthcare bill is about \$850 billion over 10 years, fully paid for, fully offset. But that is roughly 2.5 times more in savings than we are talking about the cost of our healthcare. That is really striking.

I want to go back to a point raised by Senator Udall when he was here, just to follow up on some of his concerns about the West. Will the new air quality standards that the EPA has proposed for sulfur dioxide and ozone impact the States outside of the CAIR region? Could you just come back and talk with us about that? Will the new air quality standards that EPA has proposed for sulfur dioxide and ozone impact the States outside the CAIR region?

Ms. MCCARTHY. At this point, Senator, we are still in the process of doing the modeling and analysis on the new CAIR program. But at this point, I can tell you, it looks like it will be focused in a very similar region as the original CAIR proposal.

Senator CARPER. OK. Thanks very much.

All right. Any other questions for Senator McCarthy? Well, there was a Senator McCarthy, there has been a couple of them actually, but—

Ms. MCCARTHY. I do not want to remember that.

Senator CARPER. Well, actually, one of them was pretty good. Clean Gene.

[Laughter.]

Senator CARPER. But we are glad that you could be with us today. Thanks for working with us. And among the takeaways, for me, obviously, the points I asked you to come back to, how much have we seen emissions go down since 1980, what has happened to our GDP corrected for inflation, coming back to the uncertainty raised by Senator Voinovich will be raised by Mr. McManus as well.

When we get to, say, 2015 and mercury standards, 90 percent, that is our cap, and the idea that the EPA at some point in the future, 2020, 2025 could be beyond that, that is of concern to some in the utility industry. And we have to figure out how to address that. By the same token, technology will get better. We will figure out how to reduce emissions further.

I remember being here, I think George and I were both here, for a hearing, I think he chaired it, our clean air subcommittee, it was a hearing looking at technology for mercury, about 4 or 5 years ago. And we were trying to figure out, could we get to an 80 percent reduction, was that feasible? And that point in time there were a lot of people saying we cannot even get to 80 percent. Well today, there are dozens of utilities and plants where we are at 90 percent.

So we know that the technology will get better. We can do better. The question is how can we avoid tying EPA's hands in anticipation of that improved technology and actually be able to provide you with healthier air to breathe and at the same time be responsive to the needs for certainty on the part of the utilities? I think we can figure that out, and we will just work on that.

Ms. MCCARTHY. Senator, I would be remiss if I did not point out that the CAIR rule is not the only rule that EPA is looking at at this point. As you know, we are looking at a new ozone standard which would be a nationwide standard. We are looking at the SO₂ standard. So, as we are improving these, the challenge will be a nationwide one. But CAIR itself will be eastern focused.

Senator CARPER. All right. Thank you so much. It was great to have you here, and we look forward to working with you going forward in what you described as a mutually reinforcing partnership. Thank you.

Ms. MCCARTHY. Thank you for your leadership, Senator.

Senator CARPER. Thanks so much.

I am going to ask our second panel to go ahead and come to the table, and if someone will put their name cards right where they belong so that they will know where to sit, that would be great. Thank you.

Welcome to our second panel. I think I have had a chance to shake all of your hands. It is nice to see you, some of you for a second or third time. Secretary O'Mara, I see him a lot back in the First State. It was great of all of you to come, and I have had a

chance to read your testimony, and I look forward to hearing from you and having a chance to ask some questions.

I am going to give a short introduction, and as I said to Ms. McCarthy I am going to ask you to keep your testimony to about 5 minutes. If you go a little bit over that, I will not rein you in. If we are talking about 10 minutes, we will probably have to blow the whistle. But the full content of your written statements will be included in the record.

The first witness we will hear from on the second panel is Dr. Albert Rizzo. Dr. Rizzo is here with us today on behalf of the American Lung Association. He is the Chief of Pulmonary and Critical Care Medicine of the Christiana Care Health Systems in Delaware, a real fine outfit. Dr. Rizzo's private practice includes a strong interest in asthma, in pulmonary rehabilitation and in lung cancer, and he has led national research studies related to lung health.

I am going to go ahead and just introduce each of the witnesses, and then I will come back to you to make the first statement.

Next we have Dr. Michael Durham, President of ADAES. What does that stand for?

Mr. DURHAM. ADA Environmental Solutions.

Senator CARPER. ADA Environmental Solutions. OK. All right. His firm is developing environmental technology to enable coal fueled power plants to enhance existing air pollution control equipment, maximize capacity and to improve operating efficiencies. Dr. Durham has over 30 years of experience in the measurement and the control of air pollution from utility and industrial sources.

Our third witness tells us he once spent some time in Syracuse, and we stole him from San Jose to come to Delaware and be our Secretary of Natural Resources a year ago. We are glad that he came, and his wife let him and came with him, although she misses the weather in San Jose.

We had about 3 feet of snow in Delaware last month. We do not have that very often. She sent him a text message. He was in Europe, I think on a trade mission with the Governor. She sent him a text message from Delaware where we were suffering under 3 feet of snow, and there was one word in that message. What was that word?

Mr. O'MARA. Liar.

[Laughter.]

Senator CARPER. Well, hopefully things are going to get better. It is going to be in the 50s this weekend, so maybe you will get out of the dog house. We are glad you are here and we are glad you are in Delaware, too. Collin O'Mara, Secretary of the Department of Natural Resources and Environmental Control, where he oversees air, energy and other environmental matters. He also leads the Governor's effort to create a thriving green economy and sustainable natural environment.

And George, you may be pleased to hear that our—and you may know this, but our fourth witness, John McManus, is a Buckeye. He and his family live in Columbus, the Columbus area, and he has a son who is going to graduate just in—what? A month or so?

Mr. MCMANUS. Two weeks.

Senator CARPER. Two weeks from the Ohio State University. We are both graduates, law school and undergrad, from Ohio State, so

we give you a big Ohio yell to welcome you here today. And good luck to your son. I have got two that are still in college and the days that they graduate will be days that we celebrate for more reasons than one. Others who have kids in school, you know what I mean.

Mr. McManus is the Vice President for Environmental Services of the American Electric Power Service Corporation, and we are very happy that you could be with us here today and look forward to your testimony.

Dr. Rizzo, you are up first, and we are going to ask Mr. McManus to hit clean up. So, let us take it from our left to our right.

**STATEMENT OF ALBERT A. RIZZO, M.D., FACP, FCCP, D'ABSM,
BOARD OF DIRECTORS, AMERICAN LUNG ASSOCIATION**

Dr. RIZZO. Thank you, Senator Carper. Thank you for the opportunity to testify today.

Senator CARPER. You bet.

Dr. RIZZO. I am Dr. Albert Rizzo, and as Senator Carper mentioned I am the Chief of Pulmonary and Critical Care at Christiana Care Hospitals in Delaware. I have been practicing medicine and treating patients with lung disease for about 25 years in Delaware.

But today I am here as a volunteer of the American Lung Association's National Board of Directors. In that regard, I am also here as an advocate for my patients, particularly a patient like Kristen, a 16-year-old from Middletown, Delaware, who, despite as much as she can manage her asthma, she wonders why she has trouble with sports. Also for Joan and Steve who are from North Wilmington, older patients of mine who have emphysema. And they get frustrated by the fact that they become prisoners of their air conditioned apartments during the summer months when the bad days of air quality occur.

These are quality of life issues, certainly important, but only a small part of the larger more tragic burden of emergency room visits, hospitalizations and premature deaths that you have already heard about, mainly from polluted air.

The American Lung Association urges Congress to pass S. 2995, the Clean Air Act Amendments of 2010. We are proud to support this bill because we fight for healthy air and healthier air as a result of this bill will save lives.

We see a compelling and urgent need for Congress to clean up air pollution from the power plants. Power plants emit tons of sulfur dioxide, nitric oxides and mercury. Mercury leaves the smokestacks and settles into our rivers and lakes. It is a potent neurotoxin that inflicts permanent damage on kidneys, the nervous system and affects development of the brain.

Sulfur dioxides and nitric oxides leave the smokestacks and become fine particles in the air, so tiny that they bypass the body's natural defenses and lodge deep within the lung tissues, causing damage. Most at risk for these particles are infants, children, the elderly, and especially those with heart and lung disease.

Nitrogen oxides from power plants are a key ingredient in the formation of ground level ozone or smog that blankets much of our country during the summer and acts as a powerful respiratory irri-

tant. When inhaled, ozone damages the lung tissue much like the summer sun burns our skin.

Ozone pollution at levels in the United States today contributes to early death. The EPA estimates that the particle pollution reductions of this bill would prevent between 12,000 and 30,000 premature deaths each year by the year 2025. Even as early as 2012, the EPA predicts that as many as 6,300 to 16,000 lives will be saved.

The American Lung Association publishes a State of the Air Report each year. In our 2009 report, we showed that 186 million Americans, or 60 percent of our population, live in counties that receive a failing grade for ozone or particulate matter.

As Senator Carper knows, thousands of our neighbors in Delaware are at risk from air pollution. Our report found that all three of Delaware's counties fail for ozone, and New Castle County where I live, and I believe where Senator Carper lives, fail also for daily levels of particulate matter. In New Castle County alone, more than 11,500 children with asthma are at risk from the air pollution that can either progress their disease more rapidly and more importantly can also trigger life threatening asthma attacks.

Senator Alexander has been very strongly committed to clean air, and we thank him. His home State has 15 counties that earned failing grades for air pollution. Blount County, home to Great Smoky Mountains National Park, bears a sizable burden of air pollution. Blount County suffered 77 days with unhealthful levels of ozone from 2005 to 2007 and roughly 26,000 children and 17,000 seniors in Blount County are at risk from pollution.

Attached to my testimony are the summaries from our State of the Air Report for each member of the Committee.

The Carper-Alexander bill sets stringent caps for sulfur dioxide and nitrogen oxides and ensures that toxic mercury levels will be cut. Importantly, the EPA has the authority to set tighter levels, if needed, to protect the public or the environment.

The mercury provisions provide a critical backstop for the forthcoming mercury Maximum Achievable Control Technology or MACT rule. This legislation builds upon and strengthens the existing Clean Air Act. The EPA and the States retain their critical tools and enforcement authorities. We will not support, in fact, we will vigorously oppose any changes that would undermine the enforcement of the new Source Review Program or other provisions of the Clean Air Act.

Some suggest it would be better to wait for EPA to promulgate the Clean Air Interstate Replacement rule and the MACT. We urge Congress, however, and EPA, to move forward sooner to implement the law and maximize the reduction of these pollutants.

Our concern is getting the pollution out of the air. Delays have a real and dramatic cost, a tragic human toll paid in thousands of lives lost each year. The public has waited too long for power plants to clean up. The Clean Air Act Amendments of 2010 demonstrate broad bipartisan support of this goal.

It is well past time to clean up the Nation's power plants, and please pass this life saving legislation.

Thank you again.

[The prepared statement of Dr. Rizzo follows:]



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S. 2995 The Clean Air Act Amendments of 2010

**Testimony
of
Albert A. Rizzo, M.D. FACP, FCCP, D'ABSM
Board of Directors
American Lung Association**

**Before the
Committee on Environment and Public Works
and the
Subcommittee on Clean Air and Nuclear Safety**

U.S. Senate

March 4, 2010

Good morning and thank you for the opportunity to testify today. My name is Albert A. Rizzo and I am the Chief of the Pulmonary and Critical Care Medicine Section at Christiana Care Health Systems in Delaware and I have been caring for Delawareans with lung disease for over 25 years. I trained at Johns Hopkins University, Jefferson Medical College and Georgetown University and am board certified in Pulmonary, Critical Care and Sleep Medicine. I am a member of the American Thoracic Society, a Fellow of the American College of Chest Physicians and a Diplomate of the American Board of Sleep Medicine and most importantly today I am a volunteer member of the national Board of Directors of the American Lung Association. I began my volunteer years in Delaware and ultimately served as President of the American Lung Association of Delaware and have now been committed to the Lung Association and its mission for more than 25 years.

The American Lung Association is the nation's oldest voluntary health agency, founded in 1904 to combat tuberculosis. Today our mission has broadened to save lives by improving lung health and preventing lung disease. We fight for healthy air because healthy air saves lives. We work hard to help people stop smoking and prevent kids from starting to prevent the development of lung disease. We help people, like my patients, to understand, manage and cope with their lung cancer, asthma or Chronic Obstructive Pulmonary Disease (COPD) – a disease better known as emphysema and chronic bronchitis. We do this by funding cutting edge medical research, educating the lay and professional public and, as I am doing today, by advocating for policy change that benefits the health of society. Our hundreds of thousands of volunteers across the country support this vital mission.

The American Lung Association urges the Congress to pass S. 2995, the Clean Air Act Amendments of 2010. We are proud to support this bill because it will save lives. We want to thank Senators Carper and Alexander for their bi-partisan leadership along with Senators Klobuchar, Collins and Gillibrand and the other cosponsors.

We see a compelling and urgent need for Congress to strengthen the Clean Air Act and clean up air pollution from power plants. Pollution from these plants puts at risk the lives and health of millions of Americans.

Let me start by describing the health effects of this pollution. Power plants emit tons of sulfur dioxide, nitrogen oxides and mercury. Sulfur dioxide (SO₂) and nitrogen oxides (NO_x) are transformed into fine particles in the air. These tiny particles are less than one-tenth the diameter of a single human hair. They are so tiny that they bypass the body's natural defenses of the nose and upper airways and lodge deep within the lung, where they harm human health. Studies demonstrate that those who are most at risk from the effects of this fine particle pollution include infants and children, the elderly and especially those with asthma or other lung disease or heart disease.¹ The lungs of our infants and children are small and still developing. They breathe more

¹ Many studies show children, the elderly, and persons with respiratory and/or coronary disease as particularly vulnerable to PM. The following are a few of the more recent- Pope, C. Arden III. Mortality effects of longer term exposures to fine particulate air pollution: review of recent epidemiological evidence. *Inhalation Toxicology* 2007; 19 (Suppl. 1): 33-38. Pope CA III, Dockery DW. Health Effects of Fine Particulate Air Pollution: Lines that Connect. *J Air Waste Manage Assoc* 2006; 56:709-742. Pope, CA et al. (2009). Fine Particulate Air Pollution and Life Expectancy in the United States. *N Engl J Med* 2009; 360:376-386. Eftim SE, Samet JM, Janes H, McDermott A, Dominici F. Fine Particulate Matter and Mortality: A Comparison of the Six Cities and American Cancer Society Cohorts with a Medicare Cohort. *Epidemiology* 2008; 19:209-216. Laden F, Schwartz J, Speizer FE, Dockery DW. Reduction in Fine Particulate Air Pollution and Mortality: Extended Follow-up of the Harvard Six Cities Study. *Am J Respir Crit Care Med* 2006; 173: 667-672 U.S. EPA. Integrated Science Assessment for Particulate Matter (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-08/139F, 2009.

air per pound of body weight than adults and they are more likely to be active in the outdoors on high air pollution days.²

Because nitrogen oxides are a key ingredient in the formation of ozone, power plant pollution worsens ozone. Ground level ozone, or smog, that blankets much of the United States during the summer is a powerful respiratory irritant.³ When inhaled, ozone damages the lung tissue much like the summer sun burns our skin. Ozone air pollution poses health risks for all who are exposed, be they infants, children, teenagers, seniors, and especially those with asthma and other lung diseases. Even healthy adults who work or play outdoors are at risk.

Both particulate matter and ozone cause the most egregious harm – premature death. California recently estimated that some 18,000 of their residents die from breathing particle pollution each year.⁴ We know from research that breathing particulate matter shortens life, not by days, but by anywhere from months to years.⁵ Studies have shown that ozone pollution at levels we have in the U.S. today also contributes to early death.⁶

² American Academy of Pediatrics Committee on Environmental Health, Ambient Air Pollution: health hazards to children. *Pediatrics* 2004; 114: 1699-1707.

³ U.S. EPA. Air Quality Criteria for Ozone and Related Photochemical Oxidants (2006 Final). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-05/004aF-cF, 2006.

⁴ California Air Resources Board. Methodology for Estimating Premature Deaths Associated with Long-term Exposure to Fine Airborne Particulate Matter in California: Staff Report. October 24, 2008. Available at http://www.arb.ca.gov/research/health/pm-mort/pm-mort_final.pdf.

⁵ Schwartz, Joel. Is There Harvesting in the Association of Airborne Particles with Daily Deaths and Hospital Admissions. *Epidemiology*, Vol. 12, No. 1, pp 56-61, January 2001; Brunekreef, Burt. Air Pollution and Life Expectancy: Is There a Relation? *Occup Environ Med* 1997 Nov; 54(11):781-4; Pope, C.A. III, Epidemiology of Fine Particulate Air Pollution and Human Health: Biological Mechanisms and Who's at Risk? *Environ Health Perspect* 108 (suppl 4):713-723 (2000).

⁶ Bell ML, Dominici F, and Samet JM. A Meta-Analysis of Time-Series Studies of Ozone and Mortality with Comparison to the National Morbidity, Mortality, and Air Pollution Study. *Epidemiology* 2005; 16:436-445. Levy JJ, Chermerynski SM, Sarnat JA. Ozone Exposure and Mortality: an empiric Bayes metaregression analysis. *Epidemiology* 2005; 16:458-468. Ito K, De Leon SF, Lippmann M. Associations Between Ozone and Daily Mortality: analysis and meta-analysis. *Epidemiology* 2005; 16:446-429. Bates DV. Ambient Ozone and Mortality. *Epidemiology* 2005; 16:427-429.

Death is not the only harm these pollutants produce. For hundreds of thousands of people, smog- and soot- polluted air means more breathing problems, aggravated asthma, fear-filled trips to the emergency room, and even admissions to the hospital and sometimes to the intensive care unit. These are the patients I, and physicians like me, see daily in the hospital and in our practices.

My patients already have reduced lung function from COPD, asthma, pulmonary fibrosis and other chronic lung diseases. Smog and soot exposure further impairs their breathing. I educate my patients to stay indoors or limit their activities, when possible, on “bad air” days. Despite this, we often see a rise in office and ER visits during these days. The impact on the quality of their lives, lost productivity and missed school days take a toll on all of us.

Mercury from power plants is a potent neurotoxin that inflicts permanent damage on the kidneys and the nervous system, and threatens children’s neurological and brain development. Mercury leaves the smokestacks and settles into the rivers and lakes. It accumulates in fish making them increasingly toxic. Women of childbearing age and their children who eat these fish are the ones most at risk.⁷

My patients and tens of thousands more like them will benefit from S. 2995. Last year in response to Senator Carper’s request, the Environmental Protection Agency analyzed the potential health benefits of several scenarios of NO_x and SO₂ reductions. One of the scenarios, #2, closely matches the bill as introduced, although the scenario sped up the 2018 SO₂ caps

⁷ Agency for Toxic Substances and Disease Registry. Toxicological profile for mercury. 1999; National Research Council, Toxicological Effects of Methylmercury, 1999

proposed in this bill to 2015. Using that scenario, EPA estimated that the particulate matter pollution reductions resulting from the bill would prevent between 12,000 and 30,000 premature deaths each year by 2025.⁸

Fortunately, we do not have to wait 15 years to see benefits. In 2012, as power plants install the equipment that will clean up emissions, the EPA predicts that as many as 6,300 to 16,000 lives will be saved each year. Less pollution would prevent tens of thousands of asthma exacerbations, thousands of acute myocardial infarctions, or heart attacks, as well as avoid thousands of emergency room visits and hospital admissions. The ozone pollution reductions, resulting from the NO_x limits, will help reduce premature deaths and cut lost school days, ER and hospital admissions. The U.S. could save more than \$1 billion in 2012 and \$2.5 billion in 2025.⁹ Although some of those benefits may come slightly later under the bill as introduced, these are still significant life-saving improvements in health. These improvements can benefit each of the states.

Each year the American Lung Association publishes the *State of the Air* report. In our 2009 report, we show that more than 186 million Americans – 60 percent of our population – live in counties that receive a failing grade for ozone or particulate matter.¹⁰ This is a conservative estimate because our grades are based on the EPA standards that are currently in place – standards that we know are inadequate to protect public health.¹¹

⁸ U.S. Environmental Protection Agency U.S. Environmental Protection Agency. *EPA Analysis of Alternative SO₂ and NO_x Caps for Senator Carper*. Washington DC: US EPA, July 31, 2009.

⁹ U.S. Environmental Protection Agency U.S. Environmental Protection Agency. *EPA Analysis of Alternative SO₂ and NO_x Caps for Senator Carper*. Washington DC: US EPA, July 31, 2009. www.epa.gov/airmarkt/progsregs/cair/docs/CABriefing.ppt

¹⁰ American Lung Association. *State of the Air 2009* <http://www.stateoftheair.org/>

¹¹ In September 2009 EPA announced it would reconsider the existing ozone standards, set at 0.075 ppm in March 2008, EPA proposed revisions to the ozone standard in January, 2010: On February 24, 2009 A federal appeals court ruled that the

As Senator Carper knows, thousands of our neighbors in Delaware are at risk from air pollution. Our *State of the Air* report found that all three of Delaware's counties fail for ozone and New Castle, where I live, also fails for daily levels of particulate matter. In New Castle County more than 11,500 children with asthma are at risk from air pollution. Not only from the potential long term worsening of their disease but also from a potential trigger of a life-threatening asthma attack.¹²

Senator Alexander, the American Lung Association thanks you for your dogged commitment to clean air. Your home state has 15 counties that earned failing grades for air pollution. As you know well, Blount County, home to one of the great national treasures – Great Smoky Mountains National Park – bears a sizable burden of air pollution. Our report shows that Blount County suffered seventy-seven days with unhealthful levels of ozone from 2005 to 2007. Roughly 26,000 children and more than 17,000 seniors in Blount County are at risk from pollution. The Clean Air Act Amendments of 2010 will not only help reduce the public health burden of air pollution but also reduce the burden that acid rain, haze, ozone, particulate matter and toxic mercury place on our National Parks.¹³

Attached to my testimony are the summaries from our *State of the Air* report for the states of each member of the committee. The summaries show the county-by-county air quality grades and the numbers of your constituents at risk – particularly the most vulnerable, the young,

particulate matter national ambient air quality standards was deficient and sent them back to the U.S. Environmental Protection Agency for corrective action. EPA is scheduled to announce a new proposal in November, 2010.

¹² American Lung Association. State of the Air 2009 <http://www.stateoftheair.org/>

¹³ American Lung Association. State of the Air 2009 <http://www.stateoftheair.org/>

the old, those with lung disease like asthma, chronic bronchitis and emphysema as well as those with cardiovascular disease and diabetes. You will see several states, like Rhode Island, where every county with an air pollution monitor fails for ozone. Also appended are the lists of the 25 most polluted cities—with some rankings that may surprise you. As Chairman Boxer knows, despite your state's efforts, it is not a surprise that many California cities make the dirtiest lists. But what may be a surprise to some, is Lancaster, Pennsylvania is tied with New York for the 22nd worst city for annual particle pollution levels. The report shows that air pollution – the pollution that comes from power plants – is a national problem impacting citizens all across the country.¹⁴

The Carper-Alexander bill sets stringent caps for sulfur dioxide and nitrogen oxides, and ensures that toxic mercury levels will be cut. For sulfur dioxide, the bill caps emissions at 3.5 million tons in 2012, 2 million tons in 2015 and 1.5 million tons in 2018. For nitrogen oxides, the bill caps emissions in the eastern United States at 1.39 million tons in 2012 and 1.3 million tons in 2015. In the West, the cap limits emissions to 520,000 tons in 2012 and 320,000 tons in 2015. Importantly, EPA has the authority to set tighter limits if needed to protect public health or the environment. The mercury provision provides a critical backstop for the forthcoming mercury Maximum Achievable Control Technology or MACT rule. If EPA fails to implement the MACT or is blocked from implementing the rule, the bill will require the plants to cut mercury emissions by 90 percent by 2015.

This legislation builds upon and strengthens the existing Clean Air Act. Because the bill does not change or weaken the underlying Clean Air Act, EPA and states retain their critical

¹⁴ American Lung Association. State of the Air 2009 <http://www.stateoftheair.org/>

tools and enforcement authorities. We support this bill, as introduced, precisely because it strengthens the ability to get additional pollution reductions without imposing weakening changes to the current law. We will not support – in fact, we will vigorously oppose—any changes that would undermine the enforcement of the New Source Review program or other provisions of the Clean Air Act.

We have heard from some who suggest that it would be better to wait for EPA to promulgate the Clean Air Interstate (CAIR) replacement rule and the MACT. We understand that the CAIR rule will be proposed next month and a utility MACT will be proposed next year. The American Lung Association urges both Congress and EPA to move forward. The American Lung Association will continue to support EPA's efforts to implement the Clean Air Act and we will urge EPA to maximize the reduction of these pollutants.

Congress needs to move forward on the Carper-Alexander bill, because it provides the needed health and environmental benefits. It sets enforceable reductions if litigation or another delay precludes EPA from moving forward on the mercury MACT. Our principal concern is getting the pollution out of the air. Delays have real and dramatic costs – a tragic human toll – paid in thousands of lives lost each year. The EPA and this committee have wrestled with these issues over the past decade. The public has waited too long for power plants to clean up. The Clean Air Act Amendments of 2010 demonstrate broad bi-partisan support for this goal. It is well past time to clean up the nation's power plants. Please pass this life-saving legislation. Thank you.

People at Risk In 25 U.S. Cities Most Polluted by Short-term Particle Pollution (24-hour PM_{2.5})

2009 Rank ¹	Metropolitan Statistical Areas	Total Population ²	Under 18 ³	65 and Over ⁴	Pediatric Asthma ^{5**}	Adult Asthma ^{6**}	Chronic Bronchitis ^{7**}	Emphysema ^{8**}	CV Disease ^{9**}	Diabetes ^{10**}
1	Pittsburgh-New Castle, PA	2,446,703	507,784	419,558	46,163	177,396	69,954	38,243	777,887	171,074
2	Fresno-Madera, CA	1,045,861	309,724	102,399	28,157	55,216	23,939	10,840	244,484	51,388
3	Bakersfield, CA	790,710	237,021	69,710	21,548	41,503	17,709	7,723	177,962	37,077
4	Los Angeles-Long Beach-Riverside, CA	17,755,322	4,737,865	1,849,322	430,719	977,873	428,819	198,167	4,416,799	933,827
5	Birmingham-Hoover-Cullman, AL	1,188,764	289,712	153,673	26,338	78,595	30,989	15,555	331,055	71,441
6	Salt Lake City-Ogden-Clearfield, UT	1,799,959	541,481	166,355	49,226	101,790	40,759	18,220	413,907	86,780
7	Sacramento-Arden-Arcade-Yuba City, CA-NV	2,397,691	591,294	284,980	53,755	135,649	60,679	29,190	636,141	135,775
8	Logan, UT-ID	121,090	38,091	9,654	3,463	6,707	2,549	1,032	24,876	5,073
9	Chicago-Naperville-Michigan City, IL-IN-WI	9,745,165	2,514,619	1,067,601	228,604	601,160	242,586	115,412	2,529,721	539,206
9	Detroit-Warren-Flint, MI	5,405,918	1,344,926	645,820	122,268	380,857	139,501	69,019	1,479,974	318,683
11	Indianapolis-Anderson-Columbus, IN	2,014,267	529,001	225,995	48,091	130,321	50,201	24,207	526,608	112,621
12	Visalia-Porterville, CA	421,553	134,499	39,663	12,227	21,524	9,305	4,190	94,813	19,898
13	Eugene-Springfield, OR	343,591	69,463	48,187	6,315	26,418	9,465	4,780	101,414	21,907
14	Washington-Baltimore-Northern Virginia, DC-MD-VA-WV	8,247,912	2,006,709	872,143	182,430	513,892	209,541	99,181	2,179,127	454,484
14	Hanford-Corcoran, CA	148,875	40,640	11,124	3,695	8,084	3,301	1,299	31,841	6,458
16	New York-Newark-Bridgeport, NY-NJ-CT-PA	21,961,994	5,173,130	2,824,292	470,288	1,447,924	574,690	285,495	6,111,329	1,315,110
17	Modesto, CA	511,263	147,066	52,226	13,370	27,347	11,976	5,529	123,315	26,056
18	Merced, CA	245,514	77,534	23,405	7,049	12,588	5,429	2,438	55,266	11,585
19	Louisville-Jefferson County-Elizabethtown-Scottsburg, KY-IN	1,332,214	324,395	165,296	29,490	89,830	34,720	17,313	369,687	79,721
20	Philadelphia-Camden-Vineland, PA-NJ-DE-MD	6,385,461	1,539,070	834,464	139,917	433,170	167,232	84,143	1,788,499	386,150
20	San Jose-San Francisco-Oakland, CA	726,487	1,639,367	861,264	149,035	423,837	190,849	92,528	2,006,694	429,823
22	Provo-Orem, UT	493,306	169,546	31,347	15,413	25,908	9,646	3,611	91,284	18,255
23	San Diego-Carlsbad-San Marcos, CA	2,974,859	741,404	330,820	67,401	167,704	73,751	34,396	762,821	161,535
24	Harrisburg-Carlisle-Lebanon, PA	656,781	146,271	96,234	13,298	47,490	17,923	9,323	194,665	42,344
25	St. Louis-St. Charles-Farmington, MO-IL	2,890,593	703,793	372,199	63,982	184,766	75,542	37,992	807,635	174,421

Notes:
 (1) Cities are ranked by the number of people exposed to very unhealthy (or worse) levels of short-term particle pollution (24-hour PM_{2.5}) in the Area of Metropolitan Statistical Area.
 (2) **Total Population** includes the total population of the city or county, including the population of the city or county that is located in the Area of Metropolitan Statistical Area.
 (3) **Under 18 & 65 & over** are by household (PH) and by census tracts. They include the total population of the city or county that is located in the Area of Metropolitan Statistical Area.
 (4) **Pediatric asthma** is the number of people under 18 years of age who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people under 18 years of age who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people under 18 years of age who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.
 (5) **Adult asthma** is the number of people 18 years of age and older who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people 18 years of age and older who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people 18 years of age and older who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.
 (6) **Chronic bronchitis** is the number of people 18 years of age and older who report having chronic bronchitis in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people 18 years of age and older who report having chronic bronchitis in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people 18 years of age and older who report having chronic bronchitis in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.
 (7) **Emphysema** is the number of people 18 years of age and older who report having emphysema in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people 18 years of age and older who report having emphysema in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people 18 years of age and older who report having emphysema in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.
 (8) **CV disease** is the number of people 18 years of age and older who report having cardiovascular disease in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people 18 years of age and older who report having cardiovascular disease in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people 18 years of age and older who report having cardiovascular disease in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.
 (9) **Diabetes** is the number of people 18 years of age and older who report having diabetes in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people 18 years of age and older who report having diabetes in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people 18 years of age and older who report having diabetes in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.
 (10) **Adults exposed to very unhealthy (or worse) levels of short-term particle pollution** is the number of people 18 years of age and older who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people 18 years of age and older who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people 18 years of age and older who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.

People at Risk In 25 U.S. Cities Most Polluted by Year-Round Particle Pollution (Annual PM_{2.5})

2009 Rank ¹	Metropolitan Statistical Areas	Total Population ²	Under 18 ³	65 and Over ⁴	Pediatric Asthma ^{5**}	Adult Asthma ^{6**}	Chronic Bronchitis ^{7**}	Emphysema ^{8**}	CV Disease ^{9**}	Diabetes ^{10**}
1	Bakersfield, CA	790,710	237,021	69,710	21,548	41,503	17,709	7,723	177,962	37,077
2	Pittsburgh-New Castle, PA	2,446,703	507,784	419,558	46,163	177,396	69,954	38,243	777,887	171,074
3	Los Angeles-Long Beach-Riverside, CA	17,755,322	4,737,865	1,849,322	430,719	977,873	428,819	198,167	4,416,799	933,827
4	Visalia-Porterville, CA	421,553	134,499	39,663	12,227	21,524	9,305	4,190	94,813	19,898
5	Birmingham-Hoover-Cullman, AL	1,188,764	289,712	153,673	26,338	78,595	30,989	15,555	331,055	71,441
6	Hanford-Corcoran, CA	148,875	40,640	11,124	3,695	8,084	3,301	1,299	31,841	6,458
7	Fresno-Madera, CA	1,045,861	309,724	102,399	28,157	55,216	23,939	10,840	244,484	51,388
8	Cincinnati-Middletown-Wilmington, OH-KY-IN	2,176,749	548,199	258,266	49,837	144,472	55,519	27,209	586,626	125,943
9	Detroit-Warren-Flint, MI	5,405,918	1,344,926	645,820	122,268	380,857	139,501	69,019	1,479,974	318,683
10	Cleveland-Akron-Elyria, OH	2,896,968	685,096	411,961	62,282	193,475	77,860	40,524	845,716	184,039
11	Charleston, WV	303,950	86,486	47,045	6,044	21,312	8,505	4,551	93,571	20,506
11	Huntington-Ashland, WV-KY-OH	284,026	61,030	44,610	5,548	19,934	7,856	4,139	85,861	18,713
11	Louisville-Jefferson County-Elizabethtown-Scottsburg, KY-IN	1,332,214	324,395	165,296	29,490	89,830	34,720	17,313	369,687	79,721
14	Macon-Warner Robins-Fort Valley, GA	386,534	102,065	45,073	9,278	21,597	9,673	4,727	102,072	21,892
14	St. Louis-St. Charles-Farmington, MO-IL	2,890,593	703,793	372,199	63,982	184,766	75,542	37,992	807,635	174,421
16	Wilton-Steuersville, WV-OH	122,580	24,215	23,297	2,201	8,616	3,623	2,050	40,970	9,079
17	Atlanta-Sandy Springs-Gainesville, GA-AL	5,626,400	1,521,556	467,243	138,325	311,600	133,797	59,199	1,551,339	283,618
18	Indianapolis-Anderson-Columbus, IN	2,014,267	529,001	225,995	48,091	130,321	50,201	24,207	526,608	112,621
18	Rome, GA	95,618	23,801	13,654	2,164	5,441	2,476	1,264	26,675	5,765
20	Canton-Massillon, OH	407,180	93,626	62,939	8,512	27,270	11,182	5,969	122,909	26,899
20	York-Hanover-Gettysburg, PA	521,828	120,265	71,421	10,933	37,560	13,972	7,131	150,396	32,584
22	Lancaster, PA	498,465	125,753	71,955	11,432	34,753	13,026	6,767	141,433	30,724
22	New York-Newark-Bridgeport, NY-NJ-CT-PA	21,961,994	5,173,130	2,824,292	470,288	1,447,924	574,690	285,495	6,111,329	1,315,110
24	Hagerstown-Martinsburg, MD-WV	261,798	62,892	33,215	5,718	16,957	6,731	3,309	71,251	15,281
24	Houston-Baytown-Huntsville, TX	5,729,027	1,612,940	469,062	146,633	337,275	133,968	59,157	1,351,987	283,571

Notes:
 (1) Cities are ranked by the number of people exposed to unhealthy (or worse) levels of year-round particle pollution (annual PM_{2.5}) in the Area of Metropolitan Statistical Area.
 (2) **Total Population** includes the total population of the city or county, including the population of the city or county that is located in the Area of Metropolitan Statistical Area.
 (3) **Under 18 & 65 & over** are by household (PH) and by census tracts. They include the total population of the city or county that is located in the Area of Metropolitan Statistical Area.
 (4) **Pediatric asthma** is the number of people under 18 years of age who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people under 18 years of age who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people under 18 years of age who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.
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 (7) **Emphysema** is the number of people 18 years of age and older who report having emphysema in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people 18 years of age and older who report having emphysema in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people 18 years of age and older who report having emphysema in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.
 (8) **CV disease** is the number of people 18 years of age and older who report having cardiovascular disease in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people 18 years of age and older who report having cardiovascular disease in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people 18 years of age and older who report having cardiovascular disease in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.
 (9) **Diabetes** is the number of people 18 years of age and older who report having diabetes in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people 18 years of age and older who report having diabetes in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people 18 years of age and older who report having diabetes in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.
 (10) **Adults exposed to unhealthy (or worse) levels of year-round particle pollution** is the number of people 18 years of age and older who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey. The number of people 18 years of age and older who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey is the number of people 18 years of age and older who report having asthma in the 2007 Behavioral Risk Factor Surveillance System (BRFSS) survey.

People at Risk In 25 Most Ozone-Polluted Cities

2009 Rank ¹	Metropolitan Statistical Areas	Total Population ²	Under 18 ³	65 and Over ⁴	Pediatric Asthma ⁵	Adult Asthma ⁶	Chronic Bronchitis ⁷	Emphysema ⁸
1	Los Angeles-Long Beach-Riverside, CA	17,755,322	4,737,865	1,849,322	430,719	977,873	428,819	198,167
2	Bakersfield, CA	790,710	237,021	69,710	21,548	41,503	17,709	7,723
3	Visalia-Porterville, CA	421,553	134,499	39,663	12,227	21,524	9,305	4,190
4	Fresno-Madera, CA	1,045,861	309,724	102,399	28,157	55,216	23,939	10,840
5	Houston-Baytown-Huntsville, TX	5,729,027	1,612,940	469,062	146,633	332,275	133,968	59,157
6	Sacramento-Arden-Arcade-Yuba City, CA-NV	2,397,691	591,294	284,980	53,755	135,649	60,679	29,190
7	Dallas-Fort Worth, TX	6,498,410	1,798,184	559,482	163,475	385,101	152,456	67,352
8	Charlotte-Gastonia-Salisbury, NC-SC	2,277,074	585,184	238,952	53,199	131,101	56,689	26,761
9	Phoenix-Mesa-Scottsdale, AZ	4,179,427	1,140,354	472,541	103,670	260,190	101,155	48,005
10	El Centro, CA	161,867	47,423	16,913	4,311	8,571	3,713	1,691
11	Hanford-Corcoran, CA	148,875	40,640	11,124	3,695	8,084	3,301	1,299
12	Las Vegas-Paradise-Pahrump, NV	1,880,449	494,380	199,688	44,944	94,854	46,154	21,674
13	San Diego-Carlsbad-San Marcos, CA	2,974,859	741,404	330,820	67,401	167,704	73,751	34,296
14	Washington-Baltimore-Northern Virginia, DC-MD-VA-WV	8,241,912	2,006,709	872,143	162,430	513,892	209,541	99,161
15	Cincinnati-Middletown-Wilmington, OH-KY-IN	2,176,749	548,199	258,266	49,837	144,472	55,519	27,209
16	Philadelphia-Camden-Vineland, PA-NJ-DE-MD	6,385,461	1,539,070	834,464	139,917	435,170	167,232	84,143
17	St. Louis-St. Charles-Farmington, MO-IL	2,890,593	703,793	372,199	63,982	184,766	75,542	37,992
18	New York-Newark-Bridgeport, NY-NJ-CT-PA	21,961,994	5,173,130	2,624,292	470,288	1,447,924	574,690	285,495
19	Knoxville-Sevierville-La Follette, TN	1,029,155	227,580	148,377	20,689	69,468	27,885	14,317
20	Birmingham-Hoover-Cullman, AL	1,188,764	289,712	153,673	26,338	78,595	30,989	15,555
21	Baton Rouge-Pierre Part, LA	793,028	202,254	81,268	18,387	37,014	19,552	9,031
22	Kansas City-Overland Park-Kansas City, MO-KS	2,053,928	530,224	233,084	48,203	128,867	51,779	25,151
23	Atlanta-Sandy Springs-Gainesville, GA-AL	5,626,400	1,521,556	467,243	138,325	311,600	133,797	59,199
24	Merced, CA	245,514	77,534	23,405	7,049	12,588	5,429	2,438
25	Memphis, TN-MS-AR	1,280,533	352,214	130,189	32,020	76,368	31,237	14,812

Notes:
 (1) Cities are ranked by the number of people living in areas with the highest ozone pollution.
 (2) Total Population includes the population of the city, county, and metropolitan area.
 (3) Under 18 is the percentage of the population under 18 years of age.
 (4) 65 and Over is the percentage of the population 65 years of age and over.
 (5) Pediatric asthma is the number of children under 18 years of age with asthma.
 (6) Adult asthma is the number of people 18 years of age and over with asthma.
 (7) Chronic bronchitis is the number of people with chronic bronchitis.
 (8) Emphysema is the number of people with emphysema.

Cleanest U.S. Cities for Short-term Particle Pollution (24-hour PM_{2.5})¹

Metropolitan Statistical Area	Population
Alexandria, LA	149,837
Amarillo, TX	242,240
Austin-Round Rock, TX	1,598,161
Bismarck, ND	103,242
Brownsville-Harlingen-Raymondville, TX	407,723
Cheyenne, WY	86,353
Colorado Springs, CO	609,096
Corpus Christi-Kingsville, TX	414,376
Fargo-Wahpeton, ND-MN	215,333
Farmington, NM	122,427
Fort Collins-Loveland, CO	287,574
Grant Junction, CO	139,082
Longview-Marshall, TX	287,115
Midland-Odessa, TX	255,978
Oklahoma City Shawnee, OK	1,262,027
Portland-Lewiston-South Portland, ME	619,917
Pueblo, CO	154,538
Redding, CA	179,427
Salinas, CA	407,637
San Luis Obispo-Paso Robles, CA	262,436
Santa Barbara-Santa Maria-Goleta, CA	404,197
Santa Fe-Espanola, NM	163,782
Sioux Falls, SD	227,171
Tucson, AZ	967,089

Notes:
 (1) Cities are ranked by the number of people living in areas with the lowest short-term (24-hour) PM_{2.5} pollution.

Top 25 Cleanest U.S. Cities for Long-term Particle Pollution (Annual PM_{2.5})¹

Design Value ²	Metropolitan Statistical Area	Population
1 4.3	Cheyenne, WY	86,353
2 4.7	Santa Fe-Espanola, NM	163,782
3 4.9	Honolulu, HI	905,601
4 5.8	Great Falls, MT	81,775
5 5.8	Farmington, NM	122,427
6 6.0	Anchorage, AK	362,340
6 6.0	Tucson, AZ	967,089
8 6.7	Bismarck, ND	103,242
9 6.9	Flagstaff, AZ	127,450
9 6.9	Salinas, CA	407,637
11 7.2	Redding, CA	179,427
12 7.4	Fort Collins-Loveland, CO	287,574
13 7.6	Duluth, MN-WI	274,308
14 7.7	Colorado Springs, CO	609,096
14 7.7	Pueblo, CO	154,538
14 7.7	Fargo-Wahpeton, ND-MN	215,333
17 7.8	Albuquerque, NM	835,120
18 7.9	San Luis Obispo-Paso Robles, CA	262,436
19 8.0	Midland-Odessa, TX	255,978
20 8.2	Palm Bay-Melbourne-Titusville, FL	536,161
20 8.2	Boise City-Nampa, ID	587,698
20 8.2	Reno-Sparks-Fernley, NV	462,751
23 8.3	Cape Coral-Fort Myers, FL	590,564
24 8.5	Port St. Lucie-Sebastian-Vero Beach, FL	531,958
25 8.6	Billings, MT	149,657
25 8.6	Lincoln, NE	292,219

Notes:
 (1) Cities are ranked by the number of people living in areas with the lowest long-term (annual) PM_{2.5} pollution.
 (2) Design Value is the annual average concentration of fine particulate matter (PM_{2.5}) in micrograms per cubic meter (µg/m³).
 (3) Cities are ranked by the number of people living in areas with the lowest long-term (annual) PM_{2.5} pollution.

Cleanest U.S. Cities for Ozone Air Pollution¹

Metropolitan Statistical Area	Population
Billings, MT	149,657
Carson City, NV	54,939
Coeur d'Alene, ID	134,442
Fargo-Wahpeton, ND-MN	215,333
Honolulu, HI	905,601
Laredo, TX	253,152
Lincoln, NE	292,219
Port St. Lucie-Sebastian-Vero Beach, FL	531,958
Sioux Falls, SD	227,171

Notes:
 (1) Cities are ranked by the number of people living in areas with the lowest ozone pollution.

State Table

Notes for all state data tables

- 1 **Total Population** is based on 2007 US Census and represents the at-risk populations in counties with ozone or $PM_{2.5}$ pollution monitors; it does not represent the entire state's sensitive populations.
- 2 Those **18 & under** and **65 & over** are vulnerable to ozone and $PM_{2.5}$. They should not be used as population denominators for disease estimates.
- 3 **Pediatric asthma** estimates are for those under 18 years of age and represent the estimated number of people who had asthma in 2007 based on national rates (NHIS) applied to county population estimates (US Census).
- 4 **Adult asthma** estimates are for those 18 years and older and represent the estimated number of people who had asthma during 2007 based on state rates (BRFSS) applied to county population estimates (US Census).
- 5 **Chronic bronchitis** estimates are for adults 18 and over who had been diagnosed within 2007 based on national rates (NHIS) applied to county population estimates (US Census).
- 6 **Emphysema** estimates are for adults 18 and over who have been diagnosed within their lifetime based on national rates (NHIS) applied to county population estimates (US Census).
- 7 **CV disease** estimates are based on National Heart Lung and Blood Institute (NHLBI) estimates of cardiovascular disease applied to county population estimates (U.S. Census). CV disease includes coronary heart disease, hypertension, stroke and heart failure.
- 8 **Diabetes** estimates are for adults 18 and over who have been diagnosed within their lifetime based on national rates (NHIS) applied to county population estimates (US Census).
- 9 Adding across rows does not produce valid estimates. For example, because of differences in the surveys used to gather the information, adding pediatric and adult asthma does not produce an accurate estimate of total population with asthma. Adding emphysema and chronic bronchitis will double count people with both diseases.

CALIFORNIA

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AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ALAMEDA	1,464,202	344,146	157,218	31,286	84,374	37,542	17,715	589,973	83,038
AMADOR	38,678	6,417	7,220	583	2,427	1,150	625	12,765	2,798
BUTTE	218,779	45,837	32,480	4,167	12,972	5,871	2,939	62,721	13,475
CALAVERAS	46,844	8,643	8,316	786	2,883	1,384	761	15,428	3,398
COLUSA	21,302	6,106	2,445	555	1,141	507	243	5,310	1,131
CONTRA COSTA	1,019,640	250,861	120,545	22,806	58,019	26,457	13,091	280,657	60,465
EL DORADO	175,689	38,421	19,893	3,493	10,384	4,750	2,341	50,262	10,841
FRESNO	899,348	268,840	87,342	24,440	47,296	20,503	9,278	209,328	43,995
GLENN	28,111	7,754	3,423	705	1,530	687	336	7,258	1,553
HUMBOLDT	128,864	25,874	16,362	2,352	7,751	3,486	1,695	36,714	7,861
IMPERIAL	161,867	47,423	16,913	4,311	8,571	3,713	1,691	38,026	7,991
INYO	17,449	3,750	2,898	341	1,036	499	274	5,554	1,224
KERN	790,710	237,021	69,710	21,548	41,503	17,709	7,723	177,982	37,077
KINGS	148,875	40,640	11,124	3,695	8,084	3,301	1,299	31,841	6,458
LAKE	64,664	14,095	10,447	1,281	3,812	1,801	965	19,842	4,343
LOS ANGELES	9,878,554	2,582,550	1,030,100	234,780	548,194	240,306	111,145	2,477,053	523,822
MADERA	146,513	40,884	15,057	3,717	7,920	3,436	1,562	35,156	7,393
MARIN	248,096	48,426	37,985	4,402	15,133	7,258	3,917	80,111	17,634
MARIPOSA	18,036	3,162	3,280	287	1,121	534	292	5,942	1,305
MENDOCINO	86,273	19,096	12,710	1,736	5,075	2,391	1,262	26,128	5,710
MERCED	245,514	77,534	23,405	7,049	12,588	5,429	2,438	55,266	11,585
MONO	12,801	2,544	1,501	231	774	349	169	3,663	785
MONTEREY	407,637	111,492	41,037	10,136	22,233	9,686	4,418	99,212	20,905
NAPA	132,565	30,063	18,979	2,733	7,720	3,566	1,831	38,510	8,348
NEVADA	97,027	17,765	17,087	1,615	5,994	2,899	1,605	32,418	7,161
ORANGE	2,997,033	766,234	331,797	69,658	167,815	74,630	35,414	777,475	165,540

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
PLACER	332,920	73,398	49,152	6,673	19,506	8,942	4,559	96,286	20,804
PLUMAS	20,615	3,717	3,970	338	1,278	628	357	715	1,581
RIVERSIDE	2,073,571	582,711	233,367	52,974	111,620	48,630	22,507	501,715	105,771
SACRAMENTO	1,386,667	362,861	154,056	32,988	76,932	34,049	16,063	353,901	75,181
SAN BENITO	54,667	16,138	4,793	1,467	2,904	1,278	585	13,095	2,772
SAN BERNARDINO	2,007,800	597,417	165,379	54,311	105,834	45,095	19,471	451,164	93,887
SAN DIEGO	2,974,859	741,404	330,820	67,401	167,704	73,751	34,396	762,821	161,535
SAN FRANCISCO	784,976	109,614	111,471	9,965	49,980	21,977	10,673	231,519	49,432
SAN JOAQUIN	670,990	195,322	66,579	17,757	35,714	15,585	7,136	159,899	33,722
SAN LUIS OBISPO	262,436	49,420	37,506	4,493	16,011	7,257	3,611	77,270	16,608
SAN MATEO	706,984	157,575	93,090	14,325	41,460	19,101	9,669	204,771	44,325
SANTA BARBARA	404,197	95,877	51,842	8,716	23,136	10,319	4,991	108,502	23,145
SANTA CLARA	1,748,976	419,320	186,665	38,120	100,048	44,224	20,662	457,498	97,105
SANTA CRUZ	251,747	54,512	26,162	4,956	14,887	6,653	3,141	69,084	14,738
SHASTA	179,427	39,759	27,066	3,614	10,518	4,890	2,546	53,151	11,554
SISKIYOU	44,296	8,659	8,299	787	2,692	1,314	742	14,842	3,290
SOLANO	408,599	104,966	44,312	9,542	22,875	10,233	4,888	106,882	22,820
SONOMA	464,435	103,746	60,044	9,432	27,236	12,561	6,354	134,594	29,146
STANISLAUS	511,263	147,066	52,226	13,170	27,347	11,976	5,529	123,315	26,056
SUTTER	92,040	24,467	11,246	2,224	5,072	2,263	1,093	23,777	5,072
TEHAMA	61,114	14,785	9,266	1,344	3,482	1,609	815	17,466	3,787
TULARE	421,553	134,499	39,663	12,227	21,524	9,305	4,190	94,813	19,998
TUOLUMNE	55,806	9,523	10,700	866	3,486	1,672	925	18,712	4,120
VENTURA	798,364	208,953	88,679	18,996	44,410	19,958	9,630	208,392	44,807
YOLO	195,844	44,882	18,541	4,080	11,297	4,758	2,023	47,337	9,789
TOTALS	36,389,217	9,346,169	3,984,168	849,661	2,032,502	898,072	421,607	9,313,518	1,976,780

CALIFORNIA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

CALIFORNIA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

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HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg.	Grade
ALAMEDA	12	2	0	5.0	F
AMADOR	30	2	0	11.0	F
BUTTE	58	0	0	19.3	F
CALAVERAS	58	8	0	23.3	F
COLUSA	1	0	0	0.3	B
CONTRA COSTA	17	0	0	5.7	F
EL DORADO	113	24	0	49.7	F
FRESNO	152	24	0	62.7	F
GLENN	2	0	0	0.7	B
HUMBOLDT	-	-	-	-	-
IMPERIAL	94	3	0	32.6	F
INYO	49	1	0	16.8	F
KERN	221	71	2	110.5	F
KINGS	93	3	0	32.5	F
LAKE	0	0	0	0.0	A
LOS ANGELES	185	55	11	96.5	F
MADERA	24	0	0	8.0	F
MARIN	0	0	0	0.0	A
MARIPOSA	79	2	0	27.3	F
MENDOCINO	0	0	0	0.0	A
MERCED	65	1	0	22.2	F
MONO	-	-	-	-	-
MONTEREY	1	0	0	0.3	B
NAPA	0	0	0	0.0	A
NEVADA	130	11	1	49.5	F
ORANGE	27	3	0	10.5	F

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
6	0	0	2.0	C	9.4	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
11	2	0	4.7	F	12.1	PASS
0	0	0	0.0	A	7.8	PASS
1	0	0	0.3	B	DNC	INC
18	0	0	6.0	F	8.9	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
117	24	0	51.0	F	17.4	FAIL
DNC	DNC	DNC	DNC	DNC	DNC	DNC
0	0	0	0.0	A	DNC	INC
7	2	0	3.3	F	12.7	PASS
2	0	1	1.3	C	5.5	PASS
102	27	0	47.5	F	20.3	FAIL
31	5	0	12.8	F	17.6	FAIL
0	0	0	0.0	A	4.5	PASS
77	6	0	28.7	F	17.1	FAIL
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
0	0	0	0.0	A	5.9	PASS
33	1	0	11.5	F	14.7	PASS
-	-	-	-	-	DNC	INC
0	0	0	0.0	A	6.9	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
0	0	0	0.0	A	6.4	PASS
35	1	0	12.2	F	14.4	PASS

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg.	Grade
PLACER	103	18	0	43.3	F
PLUMAS	-	-	-	-	-
RIVERSIDE	245	77	14	129.5	F
SACRAMENTO	81	19	2	37.5	F
SAN BENITO	11	0	0	3.7	F
SAN BERNARDINO	226	95	24	138.8	F
SAN DIEGO	84	3	0	29.5	F
SAN FRANCISCO	0	0	0	0.0	A
SAN JOAQUIN	26	5	0	10.2	F
SAN LUIS OBISPO	55	0	0	18.3	F
SAN MATEO	0	0	0	0.0	A
SANTA BARBARA	17	0	0	5.7	F
SANTA CLARA	14	1	0	5.2	F
SANTA CRUZ	0	0	0	0.0	A
SHASTA	24	0	0	8.0	F
SISKIYOU	0	0	0	0.0	A
SOLANO	13	0	0	4.3	F
SONOMA	0	0	0	0.0	A
STANISLAUS	45	2	0	16.0	F
SUTTER	36	1	0	12.5	F
TEHAMA	60	0	0	20.0	F
TULARE	239	43	0	101.2	F
TUOLUMNE	33	0	0	11.0	F
VENTURA	92	7	0	34.2	F
YOLO	24	0	0	8.0	F

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
3	0	0	1.0	C	9.7	PASS
9	1	0	3.5	F	11.5	PASS
105	8	0	39.0	F	19.6	FAIL
60	7	0	23.5	F	DNC	INC
-	-	-	-	-	DNC	INC
30	6	0	13.0	F	18.5	FAIL
25	3	0	9.8	F	13.0	PASS
14	0	0	4.7	F	9.3	PASS
23	0	0	7.7	F	12.8	PASS
0	0	0	0.0	A	7.9	PASS
1	1	0	0.8	B	8.9	PASS
0	0	0	0.0	A	10.1	PASS
33	0	0	11.0	F	11.1	PASS
0	0	0	0.0	A	DNC	INC
0	0	0	0.0	A	7.2	PASS
-	-	-	-	-	DNC	INC
9	0	0	3.0	D	9.8	PASS
1	0	0	0.3	B	8.1	PASS
32	2	0	11.7	F	14.6	PASS
11	0	0	3.7	F	9.7	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
36	3	0	13.5	F	19.3	FAIL
DNC	DNC	DNC	DNC	DNC	DNC	DNC
5	0	0	1.7	C	11.1	PASS
8	0	0	2.7	D	8.7	PASS

Notes:
 (1) The weighted average was derived by adding the three years of individual test data (2005-2007), multiplying the sums of each level by the assigned standard weights, i.e. 100000, 150000, 200000 and calculating the average.
 (2) Asterisk (*) indicates incomplete monitoring data for all three years. Therefore, those counties are excluded from the grade analysis or marked as Incomplete. (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Grades are as follows: A=0 B=0.3-0.9 C=1.0-2.0 D=2.1-3.2 F=3.3+

CALIFORNIA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

DELAWARE

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Delaware

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AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
KENT	152,255	38,771	19,341	3,525	8,896	3,857	1,904	40,919	8,783
NEW CASTLE	528,218	126,878	61,837	11,534	31,332	13,655	6,649	143,844	30,847
SUSSEX	184,291	39,997	36,500	3,636	11,179	5,267	2,992	59,722	13,211
TOTALS	864,764	205,646	117,678	18,695	51,408	22,779	11,545	244,484	52,841

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg	Grade
KENT	31	0	0	10.3	F
NEW CASTLE	44	2	1	16.3	F
SUSSEX	48	1	0	16.5	F

PARTICLE POLLUTION DAYS/2005-2007

County	24-Hour					Annual	
	Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/Fail
KENT	5	0	0	1.7	C	12.4	PASS
NEW CASTLE	27	0	0	9.0	F	14.7	PASS
SUSSEX	4	0	0	1.3	C	13.4	PASS

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sum of each level by the assigned standard weights (0: Orange, 1: Red, 2: Purple) and calculating the average. (2) "N/A" indicates no reporting monitoring data for all three years. Therefore, those counties are excluded from the grade analysis or received an incomplete. (3) "DNF" indicates that data on that particular pollutant is not collected in that county. (4) Grades are as follows: A=0, B=1-3, C=4, D=5, E=6-8, F=9-13.

DELAWARE

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

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AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ADA	373,406	99,135	36,371	9,012	23,668	9,081	4,185	93,362	19,764
BANNOCK	79,925	22,722	8,228	2,066	4,942	1,902	891	19,702	4,382
BENEWAH	9,243	2,225	1,526	202	606	258	143	2,890	639
BONNEVILLE	96,545	29,290	10,106	2,663	5,807	2,271	1,092	23,788	5,084
BOUNDARY	10,872	2,722	1,543	247	703	293	156	3,220	706
BUTTE	2,771	708	452	64	178	76	43	855	189
CANYON	179,381	56,201	18,270	5,109	10,665	4,026	1,853	41,419	8,733
ELMORE	28,856	8,519	2,352	774	1,758	645	275	6,421	1,331
FRANKLIN	12,203	4,076	1,446	371	704	277	138	2,953	635
GEM	16,496	4,134	2,836	376	1,072	444	244	4,954	1,089
IDAHO	15,345	3,103	2,960	282	1,039	460	265	5,246	1,170
KOOTENAI	134,442	33,351	18,555	3,032	8,741	3,522	1,808	38,022	8,244
LEMHI	7,717	1,610	1,429	146	527	230	132	2,621	585
POWER	7,684	2,277	907	207	467	188	95	2,015	436
SHOSHONE	12,838	2,627	2,426	239	883	382	220	4,352	969
TOTALS	987,724	272,700	109,407	24,791	61,782	24,054	11,541	251,819	53,758

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg	Grade
ADA	22	0	0	7.3	F
BANNOCK	DNC	DNC	DNC	DNC	DNC
BENEWAH	DNC	DNC	DNC	DNC	DNC
BONNEVILLE	DNC	DNC	DNC	DNC	DNC
BOUNDARY	DNC	DNC	DNC	DNC	DNC
BUTTE	0	0	0	0.0	A
CANYON	-	-	-	-	-
ELMORE	-	-	-	-	-
FRANKLIN	DNC	DNC	DNC	DNC	DNC
GEM	DNC	DNC	DNC	DNC	DNC
IDAHO	DNC	DNC	DNC	DNC	DNC
KOOTENAI	0	0	0	0.0	A
LEMHI	DNC	DNC	DNC	DNC	DNC
POWER	DNC	DNC	DNC	DNC	DNC
SHOSHONE	DNC	DNC	DNC	DNC	DNC

PARTICLE POLLUTION DAYS/2005-2007

County	24-Hour					Annual	
	Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/Fail
ADA	1	0	0	0.3	B	DNC	INC
BANNOCK	-	-	-	-	-	DNC	INC
BENEWAH	4	0	0	1.3	C	9.7	PASS
BONNEVILLE	-	-	-	-	-	DNC	INC
BOUNDARY	-	-	-	-	-	DNC	INC
BUTTE	DNC	DNC	DNC	DNC	DNC	DNC	DNC
CANYON	5	0	0	1.7	C	8.2	PASS
ELMORE	DNC	DNC	DNC	DNC	DNC	DNC	DNC
FRANKLIN	23	4	0	9.7	F	7.7	PASS
GEM	-	-	-	-	-	DNC	INC
IDAHO	3	0	0	1.0	C	9.8	PASS
KOOTENAI	DNC	DNC	DNC	DNC	DNC	DNC	DNC
LEMHI	-	-	-	-	-	DNC	INC
POWER	-	-	-	-	-	DNC	INC
SHOSHONE	7	0	0	2.3	D	12.0	PASS

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sum of each level by the assigned standard weights, i.e. weighting 15 times 2005 data, and calculating the average. (2) A streak (*) indicates incomplete monitoring data for all three years. Therefore, those counties are excluded from the grade analysis or recorded as incomplete. (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Levels are as follows: A=0.0 B=0.3 C=0.9 D=2.3 E=3.3 F=4.3

IDAHO

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AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

AT-RISK GROUPS

Parish	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ASCENSION	99,056	28,684	8,025	2,608	4,408	2,277	998	22,910	4,793
BEAUREGARD	34,776	8,865	4,342	806	1,624	883	436	9,368	2,012
BOSSIER	108,705	29,582	12,507	2,689	4,959	2,666	1,287	27,994	5,982
CADDO	252,609	64,165	34,400	5,833	11,813	6,514	3,313	70,036	15,142
CALCASIEU	184,512	47,291	23,019	4,299	8,600	4,701	2,337	50,001	10,763
CONCORDIA	19,058	4,762	2,988	433	896	509	273	5,613	1,229
EAST BATON ROUGE	430,317	107,470	45,289	9,770	20,229	10,687	4,961	110,263	23,356
GRANT	19,758	5,124	2,526	466	917	503	252	5,372	1,158
IBERVILLE	32,501	7,767	3,702	706	1,550	828	394	8,639	1,840
JEFFERSON	423,520	99,906	57,713	9,082	20,281	11,345	5,840	122,573	26,629
LAFAYETTE	204,843	52,804	20,853	4,800	9,526	5,040	2,337	51,965	11,001
LAFOURCHE	92,713	22,659	11,059	2,060	4,390	2,369	1,150	24,929	5,335
LIVINGSTON	116,580	31,723	10,613	2,884	5,316	2,769	1,242	28,138	5,915
ORLEANS	239,124	44,085	30,363	4,008	12,220	6,694	3,298	70,874	15,252
OUACHITA	149,502	39,595	18,309	3,600	6,889	3,710	1,810	39,143	8,377
PLAQUEMINES	21,540	5,652	2,398	514	995	545	267	5,758	1,239
POINTE COUPEE	22,392	5,412	3,290	492	1,064	601	317	6,565	1,432
RAPIDES	130,079	33,485	17,451	3,044	6,055	3,338	1,695	35,854	7,750
ST. BERNARD	19,826	3,382	1,731	307	1,030	551	251	5,627	1,194

AT-RISK GROUPS

Parish	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ST. CHARLES	52,044	13,862	5,079	1,260	2,392	1,293	614	13,454	2,875
ST. JAMES	21,578	5,602	2,667	509	1,001	549	274	5,847	1,260
ST. JOHN THE BAPTIST	47,684	13,739	4,072	1,249	2,126	1,125	512	11,500	2,433
ST. MARY	51,311	13,553	6,713	1,232	2,367	1,313	669	14,121	3,058
ST. TAMMANY	226,625	58,962	26,429	5,360	10,505	5,787	2,875	61,495	13,264
TANGIPAHOA	115,398	30,410	12,550	2,765	5,336	2,812	1,314	29,105	6,168
TERREBONNE	108,424	28,901	11,720	2,627	4,983	2,671	1,272	27,868	5,943
WEST BATON ROUGE	22,625	5,778	2,367	525	1,055	566	268	5,891	1,256
TOTALS	3,247,100	813,220	382,175	73,930	152,516	82,644	40,255	870,904	186,666

LOUISIANA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

LOUISIANA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Louisiana

2325 Severn Avenue, Suite 8
Metairie, LA 70001-6918
(504) 838-5864
www.lungusa.org/louisiana

HIGH OZONE DAYS/2005-2007

Parish	Orange	Red	Purple	Wgt. Avg.	Grade
ASCENSION	34	2	0	12.3	F
BEAUREGARD	*	*	*	*	*
BOSSIER	28	0	0	9.3	F
CADDO	31	0	0	10.3	F
CALCASIEU	29	1	0	10.2	F
CONCORDIA	DNC	DNC	DNC	DNC	DNC
EAST BATON ROUGE	56	11	0	24.2	F
GRANT	*	*	*	*	*
IBERVILLE	68	5	0	25.2	F
JEFFERSON	29	1	0	10.2	F
LAFAYETTE	21	0	0	7.0	F
LAFOURCHE	23	1	0	8.2	F
LIVINGSTON	25	0	0	8.3	F
ORLEANS	*	*	*	*	*
QUACHITA	13	0	0	4.3	F
PLAQUEMINES	DNC	DNC	DNC	DNC	DNC
POINTE COUPEE	38	3	0	14.2	F
RAPIDES	DNC	DNC	DNC	DNC	DNC
ST BERNARD	*	*	*	*	*

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
4	0	0	1.3	C	DNC	INC
3	0	0	1.0	C	10.9	PASS
*	*	*	*	*	DNC	INC
5	0	0	1.7	C	13.3	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
1	0	0	0.3	B	13.0	PASS
7	0	0	2.3	D	11.4	PASS
1	0	0	0.3	B	11.0	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
3	0	0	1.0	C	DNC	INC
4	0	0	1.3	C	12.2	PASS
*	*	*	*	*	DNC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
0	0	0	0.0	A	11.0	PASS
3	0	0	1.0	C	DNC	INC

HIGH OZONE DAYS/2005-2007

Parish	Orange	Red	Purple	Wgt. Avg.	Grade
ST. CHARLES	15	0	0	5.0	F
ST. JAMES	18	0	0	6.0	F
ST. JOHN THE BAPTIST	22	0	0	7.3	F
ST. MARY	*	*	*	*	*
ST. TAMMANY	DNC	DNC	DNC	DNC	DNC
TANGIPAHOA	DNC	DNC	DNC	DNC	DNC
TERREBONNE	DNC	DNC	DNC	DNC	DNC
WEST BATON ROUGE	25	3	0	9.8	F

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
*	*	*	*	*	DNC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
0	0	0	0.0	A	DNC	INC
3	0	0	1.0	C	12.4	PASS
0	1	0	0.5	B	10.8	PASS
4	1	0	1.8	C	13.7	PASS

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sum of each level by the assigned standard weight (1), then adding 15 and 25 (purple) and calculating the average. (2) Asterisk (*) indicates incomplete monitoring data for all three years. Therefore, these counties are excluded from the ozone analysis or received an incomplete. (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Incidents are as follows: A=0.0, B=0.3, C=0.9, D=1.3, E=1.7, F=2.3.

LOUISIANA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2005 |

MARYLAND

American Lung Association in Maryland
Executive Plaza I, Suite 600 11350 McCormick Road
Hunt Valley, MD 21031
(410) 560-2120
www.lungusa.org/maryland

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ANNE ARUNDEL	512,154	123,957	56,517	11,269	31,951	13,188	6,360	138,281	29,617
BALTIMORE CITY	637,455	155,755	75,658	14,105	39,656	16,254	7,844	170,623	36,462
BALTIMORE	788,994	177,547	113,302	16,141	50,475	21,266	10,918	229,612	49,766
CALVERT	88,223	22,542	8,686	2,031	5,417	2,220	1,046	23,033	4,911
CARROLL	169,220	41,481	19,741	3,771	10,531	4,397	2,172	46,608	10,041
CECIL	99,695	24,729	11,047	2,248	6,159	2,511	1,192	26,159	5,572
CHARLES	140,444	37,625	11,651	3,420	8,423	3,362	1,494	34,012	7,149
FREDERICK	224,705	58,380	22,530	5,307	13,667	5,575	2,618	57,771	12,296
GARRETT	29,627	6,536	4,920	594	1,911	820	440	9,041	1,977
HARFORD	239,993	60,620	27,176	5,511	14,779	6,143	3,008	64,857	13,942
KENT	19,987	3,737	3,879	340	1,346	581	320	6,493	1,425
MONTGOMERY	930,813	226,246	113,190	20,568	58,144	24,440	12,246	260,713	56,351
PRINCE GEORGE'S	828,770	208,468	74,818	18,952	50,847	20,388	9,191	207,576	43,756
WASHINGTON	145,113	33,189	19,903	3,017	9,211	3,802	1,888	40,449	8,685
WORCESTER	49,374	9,585	10,962	853	3,325	1,471	854	16,872	3,745
TOTALS	4,904,567	1,189,397	573,980	108,128	305,842	126,418	61,592	1,332,099	285,696

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg	Grade
ANNE ARUNDEL	48	2	1	17.7	F
BALTIMORE CITY	-	-	-	-	-
BALTIMORE	50	5	0	19.2	F
CALVERT	29	0	0	9.7	F
CARROLL	39	1	0	13.5	F
CECIL	53	6	1	21.5	F
CHARLES	38	3	0	14.2	F
FREDERICK	42	0	0	14.0	F
GARRETT	13	0	0	4.3	F
HARFORD	65	9	0	26.2	F
KENT	40	1	0	13.8	F
MONTGOMERY	33	3	0	12.5	F
PRINCE GEORGE'S	67	7	0	25.8	F
WASHINGTON	24	0	0	8.0	F
WORCESTER	-	-	-	-	-

PARTICLE POLLUTION DAYS/2005-2007

County	24-Hour					Annual	
	Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/Fail
ANNE ARUNDEL	7	0	0	2.3	D	14.3	PASS
BALTIMORE CITY	39	0	0	13.0	F	15.6	FAIL
BALTIMORE	25	0	0	8.3	F	14.5	PASS
CALVERT	DNC	DNC	DNC	DNC	DNC	DNC	DNC
CARROLL	DNC	DNC	DNC	DNC	DNC	DNC	DNC
CECIL	2	0	0	0.7	B	12.5	PASS
CHARLES	DNC	DNC	DNC	DNC	DNC	DNC	DNC
FREDERICK	DNC	DNC	DNC	DNC	DNC	DNC	DNC
GARRETT	DNC	DNC	DNC	DNC	DNC	DNC	DNC
HARFORD	4	0	0	1.3	C	12.4	PASS
KENT	DNC	DNC	DNC	DNC	DNC	DNC	DNC
MONTGOMERY	3	0	0	1.0	C	12.2	PASS
PRINCE GEORGE'S	8	0	0	2.7	D	12.8	PASS
WASHINGTON	2	0	0	0.7	B	13.2	PASS
WORCESTER	DNC	DNC	DNC	DNC	DNC	DNC	DNC

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sums of each level by the geographic standard weights, i.e., 1=orange, 15=red, 2=purple and calculating the average. (2) Airtrak 17 indicates incomplete monitoring data for all three years. Therefore, these counties are excluded from the grade analysis or marked as incomplete. (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Grades are as follows: A=10, B=11, C=12, D=13, E=14, F=15.

MARYLAND

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

MINNESOTA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Minnesota

490 Concordia Avenue
St. Paul, MN 55103-2441
(651) 227-8004
www.lungusa.org/minnesota

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ANOKA	326,252	86,151	27,263	7,832	18,748	7,955	3,600	81,073	17,138
BECKER	31,964	7,375	5,306	670	1,867	882	479	9,781	2,147
CARLTON	33,893	7,497	5,000	682	2,022	923	478	10,006	2,174
CASS	28,723	6,275	5,403	570	1,693	818	460	9,230	2,039
CROW WING	61,648	14,070	10,807	1,279	3,617	1,694	922	18,821	4,124
DAKOTA	390,478	104,895	32,489	9,536	22,286	9,482	4,304	96,758	20,473
GOODHUE	45,839	10,535	6,995	958	2,691	1,254	665	13,746	3,004
HENNEPIN	1,136,599	267,405	123,283	24,310	67,387	29,393	14,046	306,953	65,603
LAKE	10,741	2,019	2,206	184	653	325	188	3,712	826
LYON	24,695	5,803	3,637	528	1,453	651	333	7,020	1,517
MILLE LACS	26,354	6,297	4,167	572	1,536	699	367	7,632	1,658
OLMSTED	139,747	35,701	16,396	3,246	8,052	3,530	1,719	37,198	7,971
RAMSEY	499,891	121,327	63,534	11,030	29,193	12,982	6,461	138,150	29,748
SCOTT	126,642	38,028	8,151	3,457	7,015	2,795	1,149	27,382	5,645
ST. LOUIS	196,694	38,538	30,762	3,503	12,077	5,584	2,935	60,948	13,288
STEARNS	146,051	33,475	17,291	3,043	8,779	3,714	1,740	38,500	8,154
WASHINGTON	226,475	59,917	19,582	5,447	12,955	5,594	2,589	57,557	12,242
WRIGHT	117,372	33,831	9,972	3,076	6,559	2,706	1,193	27,302	5,717
TOTALS	3,570,058	879,139	392,244	79,923	208,583	90,982	43,628	951,771	203,469

HIGH OZONE DAYS/2005-2007

County	2005-2007			Wgt. Avg	Grade
	Orange	Red	Purple		
ANOKA	7	0	0	2.3	D
BECKER	0	0	0	0.0	A
CARLTON	0	0	0	0.0	A
CASS	DNC	DNC	DNC	DNC	DNC
CROW WING	4	0	0	1.3	C
DAKOTA	DNC	DNC	DNC	DNC	DNC
GOODHUE	4	0	0	1.3	C
HENNEPIN	DNC	DNC	DNC	DNC	DNC
LAKE	1	0	0	0.3	B
LYON	0	0	0	0.0	A
MILLE LACS	8	0	0	2.7	D
OLMSTED	2	0	0	0.7	B
RAMSEY	DNC	DNC	DNC	DNC	DNC
SCOTT	2	0	0	0.7	B
ST. LOUIS	2	0	0	0.7	B
STEARNS	1	0	0	0.3	B
WASHINGTON	6	0	0	2.0	C
WRIGHT	7	0	0	2.3	D

PARTICLE POLLUTION DAYS/2005-2007

County	24-Hour					Annual	
	Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/Fail
ANOKA	DNC	DNC	DNC	DNC	DNC	DNC	DNC
BECKER	DNC	DNC	DNC	DNC	DNC	DNC	DNC
CARLTON	DNC	DNC	DNC	DNC	DNC	DNC	DNC
CASS	1	0	0	0.3	B	5.7	PASS
CROW WING	DNC	DNC	DNC	DNC	DNC	DNC	DNC
DAKOTA	2	0	0	0.7	B	9.6	PASS
GOODHUE	DNC	DNC	DNC	DNC	DNC	DNC	DNC
HENNEPIN	2	0	0	0.7	B	9.8	PASS
LAKE	DNC	DNC	DNC	DNC	DNC	DNC	DNC
LYON	DNC	DNC	DNC	DNC	DNC	DNC	DNC
MILLE LACS	2	0	0	0.7	B	6.7	PASS
OLMSTED	2	0	0	0.7	B	DNC	INC
RAMSEY	1	1	0	0.8	B	11.2	PASS
SCOTT	2	0	0	0.7	B	9.2	PASS
ST. LOUIS	1	0	0	0.3	B	7.6	PASS
STEARNS	3	0	0	1.0	C	8.5	PASS
WASHINGTON	-	-	-	-	-	DNC	INC
WRIGHT	DNC	DNC	DNC	DNC	DNC	DNC	DNC

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sum of each level by the assigned standard weight, or: 15 (red), 20 (purple) and calculating the average. (2) Asterisk (*) indicates incomplete monitoring data for all three years. Therefore, these counties are excluded from the grade analysis or marked as incomplete. (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Counties are as follows: ANOKA, BECKER, CARLTON, CASS, CROW WING, DAKOTA, GOODHUE, HENNEPIN, LAKE, LYON, MILLE LACS, OLSTED, RAMSEY, SCOTT, ST. LOUIS, STEARNS, WASHINGTON, WRIGHT.

MINNESOTA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

MISSOURI

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Missouri

118 Hampton Avenue
St. Louis, MO 63139-3196
(314) 645-5505
www.lungusa.org/missouri

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
BOONE	152,435	34,125	13,858	3,102	10,005	3,739	1,586	37,142	7,686
BUCHANAN	86,485	20,381	12,524	1,853	5,595	2,278	1,162	24,532	5,301
CASS	97,133	25,646	11,118	2,331	6,079	2,426	1,179	25,539	5,472
CEDAR	13,729	3,170	2,850	288	891	391	228	4,491	999
CLAY	211,952	54,806	22,676	4,982	13,374	5,288	2,517	55,142	11,764
CLINTON	20,894	5,013	2,948	456	1,350	555	287	6,013	1,306
GREENE	263,980	58,247	35,964	5,295	17,401	6,951	3,421	73,655	15,779
JACKSON	666,890	170,640	81,321	15,515	42,222	17,041	8,464	181,148	39,016
JEFFERSON	216,076	54,575	22,276	4,961	13,775	5,454	2,592	56,811	12,131
LINCOLN	51,528	13,993	5,083	1,272	3,186	1,235	566	12,670	2,676
MONROE	9,205	2,189	1,603	199	595	253	140	2,831	623
PERRY	18,794	4,591	2,926	417	1,203	499	263	5,461	1,189
PLATTE	84,881	20,809	8,148	1,892	5,480	2,166	1,021	22,467	4,796
ST. CHARLES	343,952	90,898	35,172	8,264	21,542	8,476	3,991	87,959	18,722
ST. LOUIS CITY	350,759	88,110	40,756	8,010	22,320	8,882	4,298	93,332	19,970
ST. LOUIS	995,118	232,461	141,481	21,133	65,038	27,098	14,235	295,504	64,532
STE. GENEVIEVE	17,841	4,020	2,653	365	1,175	487	255	5,310	1,157
TOTALS	3,601,652	883,674	443,357	80,335	231,230	93,220	46,204	990,008	213,117

HIGH OZONE DAYS/2005-2007

County	Orange			Purple	Wgt. Avg	Grade
	Orange	Red	Purple			
BOONE	DNC	DNC	DNC	DNC	DNC	
BUCHANAN	DNC	DNC	DNC	DNC	DNC	
CASS	14	0	0	4.7	F	
CEDAR	12	0	0	4.0	F	
CLAY	67	4	0	24.3	F	
CLINTON	46	0	0	15.3	F	
GREENE	13	0	0	4.3	F	
JACKSON	-	-	-	-	-	
JEFFERSON	45	2	0	16.0	F	
LINCOLN	42	3	0	15.5	F	
MONROE	10	0	0	3.3	F	
PERRY	36	0	0	12.0	F	
PLATTE	-	-	-	-	-	
ST. CHARLES	73	5	0	26.8	F	
ST. LOUIS CITY	44	3	0	16.2	F	
ST. LOUIS	70	7	0	26.8	F	
STE. GENEVIEVE	31	1	0	10.8	F	

PARTICLE POLLUTION DAYS/2005-2007

County	24-Hour					Annual	
	Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/Fail
BOONE	-	-	-	-	-	DNC	INC
BUCHANAN	3	0	0	1.0	C	12.8	PASS
CASS	0	0	0	0.0	A	10.8	PASS
CEDAR	-	-	-	-	-	DNC	INC
CLAY	0	0	0	0.0	A	11.3	PASS
CLINTON	DNC	DNC	DNC	DNC	DNC	DNC	DNC
GREENE	1	0	0	0.3	B	11.8	PASS
JACKSON	4	0	0	1.3	C	12.6	PASS
JEFFERSON	21	0	0	7.0	F	13.9	PASS
LINCOLN	DNC	DNC	DNC	DNC	DNC	DNC	DNC
MONROE	-	-	-	-	-	DNC	INC
PERRY	DNC	DNC	DNC	DNC	DNC	DNC	DNC
PLATTE	DNC	DNC	DNC	DNC	DNC	DNC	DNC
ST. CHARLES	7	0	0	2.3	D	13.3	PASS
ST. LOUIS CITY	26	0	0	8.7	F	14.6	PASS
ST. LOUIS	13	0	0	4.3	F	13.4	PASS
STE. GENEVIEVE	3	0	0	1.0	C	13.3	PASS

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sum of each level by the assigned standard weights, i.e., Orange 1, Red 2, Purple 4, and calculating the average. (2) Asterisk (*) indicates incomplete monitoring data for all three years. Therefore, those counties are excluded from the grade analysis or received an incomplete. (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Grades are as follows: A=0.0 B=1.0 C=1.0 D=2.0 E=3.0 F=4.0 G=5.0

MISSOURI

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

MONTANA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Montana

825 Helena Avenue
Helena, MT 59601-3459
(406) 442-6556
www.lungusa.org/montana

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
CASCADE	81,775	20,402	12,414	1,855	5,663	2,192	1,174	24,131	5,285
FLATHEAD	86,844	20,471	11,999	1,861	6,136	2,338	1,200	25,217	5,494
GALLATIN	87,559	18,908	7,442	1,719	6,310	2,186	934	21,768	4,524
LAKE	28,438	6,898	4,483	627	1,988	776	421	8,599	1,889
LEWIS AND CLARK	59,998	13,641	7,565	1,240	4,288	1,633	834	17,568	3,819
LINCOLN	18,885	3,855	3,635	350	1,389	568	329	6,494	1,430
MISSOULA	105,650	22,178	10,928	2,016	7,700	2,758	1,265	28,296	5,984
RAVALLI	40,596	9,033	6,936	821	2,896	1,151	642	12,920	2,858
ROSEBUD	9,182	2,676	982	243	603	231	118	2,481	540
SANDERS	11,033	2,162	2,150	197	819	334	193	3,813	851
SILVER BOW	32,652	7,201	5,460	655	2,348	917	500	10,190	2,240
YELLOWSTONE	139,936	33,891	19,115	3,081	9,786	3,710	1,908	40,072	8,700
TOTALS	702,148	161,316	92,309	14,665	49,927	18,794	9,519	201,548	43,624

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg.		Grade
CASCADE	DNC	DNC	DNC	DNC	DNC	
FLATHEAD	0	0	0	0.0	A	
GALLATIN	DNC	DNC	DNC	DNC	DNC	
LAKE	DNC	DNC	DNC	DNC	DNC	
LEWIS AND CLARK	DNC	DNC	DNC	DNC	DNC	
LINCOLN	DNC	DNC	DNC	DNC	DNC	
MISSOULA	-	-	-	-	-	
RAVALLI	DNC	DNC	DNC	DNC	DNC	
ROSEBUD	DNC	DNC	DNC	DNC	DNC	
SANDERS	DNC	DNC	DNC	DNC	DNC	
SILVER BOW	DNC	DNC	DNC	DNC	DNC	
YELLOWSTONE	0	0	0	0.0	A	

PARTICLE POLLUTION DAYS/2005-2007

County	24-Hour					Annual	
	Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
CASCADE	5	0	0	1.7	C	5.8	PASS
FLATHEAD	2	2	0	1.7	C	9.6	PASS
GALLATIN	7	2	0	3.3	F	4.3	PASS
LAKE	-	-	-	-	-	DNC	INC
LEWIS AND CLARK	7	0	0	2.3	D	8.0	PASS
LINCOLN	13	1	0	4.6	F	14.7	PASS
MISSOULA	14	1	0	5.2	F	101	PASS
RAVALLI	6	1	0	2.5	D	8.6	PASS
ROSEBUD	-	-	-	-	-	DNC	INC
SANDERS	0	1	0	0.5	B	6.9	PASS
SILVER BOW	15	1	0	5.5	F	10.5	PASS
YELLOWSTONE	0	2	0	1.0	C	8.6	PASS

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sums of each level by the assigned standard weights, i.e., Orange: 15 wgt, 20 purple and calculating the average. (2) Asterisk (*) indicates incomplete monitoring data for all three years. Therefore, those counties are excluded from the grade analysis or received an incomplete. (3) DNC indicates that data on that particular pollutant has not collected in that county. (4) Grades are as follows: A=0, B=1-2, C=3-4, D=5-6, E=7-8, F=9-10, G=11-12, H=13-14, I=15-16, J=17-18, K=19-20, L=21-22, M=23-24, N=25-26, O=27-28, P=29-30, Q=31-32, R=33-34, S=35-36, T=37-38, U=39-40, V=41-42, W=43-44, X=45-46, Y=47-48, Z=49-50.

MONTANA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

NEW MEXICO

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

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AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
BERNALILLO	629,292	155,593	75,933	14,145	41,008	16,061	7,833	169,371	36,291
CHAVES	62,595	16,550	9,297	1,505	3,969	1,605	838	17,476	3,795
DONA ANA	198,791	54,656	23,455	4,969	12,443	4,758	2,250	49,548	10,505
EDDY	51,002	13,410	7,041	1,219	3,251	1,320	686	14,327	3,116
GRANT	29,699	6,613	5,728	601	1,984	847	481	9,599	2,126
LEA	58,043	16,529	6,871	1,503	3,589	1,401	683	14,777	3,162
LUNA	26,996	7,402	5,474	675	1,674	714	413	8,176	1,810
SAN JUAN	122,427	33,845	12,827	3,077	7,680	2,965	1,403	30,848	6,568
SANDOVAL	117,866	30,420	12,648	2,765	7,586	2,949	1,408	30,793	6,576
SANTA FE	142,955	30,181	18,725	2,744	9,782	3,951	2,011	42,449	9,212
VALENCIA	71,364	18,614	8,081	1,692	4,571	1,784	862	18,731	4,007
TOTALS	1,511,030	383,813	186,050	34,892	97,537	38,356	18,868	406,097	87,168

HIGH OZONE DAYS/2005-2007

County	24-Hour			Wgt. Avg	Grade
	Orange	Red	Purple		
BERNALILLO	15	0	0	5.0	F
CHAVES	DNC	DNC	DNC	DNC	DNC
DONA ANA	18	0	0	6.0	F
EDDY	6	0	0	2.0	C
GRANT	0	0	0	0.0	A
LEA	6	0	0	2.0	C
LUNA	-	-	-	-	-
SAN JUAN	24	0	0	8.0	F
SANDOVAL	7	0	0	2.3	D
SANTA FE	-	-	-	-	-
VALENCIA	-	-	-	-	-

PARTICLE POLLUTION DAYS/2005-2007

County	24-Hour					Annual	
	Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/Fail
BERNALILLO	2	0	0	0.7	B	7.1	PASS
CHAVES	0	0	0	0.0	A	6.6	PASS
DONA ANA	6	0	0	2.0	C	9.7	PASS
EDDY	DNC	DNC	DNC	DNC	DNC	DNC	DNC
GRANT	0	0	0	0.0	A	DNC	INC
LEA	0	0	0	0.0	A	DNC	INC
LUNA	DNC	DNC	DNC	DNC	DNC	DNC	DNC
SAN JUAN	0	0	0	0.0	A	5.8	PASS
SANDOVAL	2	0	0	0.7	B	7.8	PASS
SANTA FE	0	0	0	0.0	A	4.7	PASS
VALENCIA	DNC	DNC	DNC	DNC	DNC	DNC	DNC

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sums of each level by the assigned standard weights (i.e., 1/3weight, 1/3weight, 2/3weight) and calculating the average. (2) Asterisk (*) indicates incomplete or inconsistent data for all three years. Therefore, those counties are excluded from the grade analysis or removed as incomplete. (3) DNC indicates that data on that particulate pollutant is not collected in that county. (4) Grades are as follows: A=0.0 B=0.5 C=1.0 D=1.5 E=2.0 F=3.0.

NEW MEXICO

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

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AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ATLANTIC	270,644	65,045	37,532	5,913	17,028	7,716	3,625	76,563	16,562
BERGEN	895,744	197,496	132,209	17,954	57,784	24,722	12,979	269,595	58,817
CAMDEN	513,769	128,429	62,967	11,675	32,060	13,199	6,534	140,105	30,146
CUMBERLAND	155,544	38,024	19,413	3,457	9,765	3,945	1,910	41,492	8,859
ESSEX	776,087	198,343	90,495	18,031	48,128	19,542	9,471	205,500	43,978
GLOUCESTER	285,755	67,124	32,921	6,102	18,242	7,405	3,575	77,712	16,632
HUDSON	598,160	130,346	65,061	11,904	39,035	15,188	6,875	155,093	32,594
HUNTERDON	129,348	30,035	14,459	2,730	8,311	3,504	1,767	37,446	8,136
MERCER	365,449	84,231	43,772	7,657	23,431	9,501	4,593	99,797	21,345
MIDDLESEX	786,629	181,367	94,772	16,488	50,584	20,432	9,833	214,212	45,744
MONMOUTH	642,030	154,596	82,609	14,054	40,536	17,154	8,802	184,980	40,218
MORRIS	488,475	116,696	61,578	10,609	30,944	13,038	6,642	140,120	30,418
OCEAN	565,493	131,100	117,194	11,918	35,242	15,837	9,098	180,668	39,985
PASSAIC	492,115	127,258	59,297	11,569	30,353	12,395	6,072	130,981	28,092
UNION	524,658	130,760	65,865	11,887	32,748	13,571	6,786	144,705	31,213
WARREN	109,737	26,452	14,269	2,405	6,920	2,899	1,472	31,130	6,743
TOTALS	7,601,635	1,807,902	994,413	164,356	481,112	199,449	100,035	2,130,100	459,480

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg	Grade
ATLANTIC	24	0	0	8.0	F
BERGEN	-	-	-	-	-
CAMDEN	70	8	0	27.3	F
CUMBERLAND	30	2	0	11.0	F
ESSEX	-	-	-	-	-
GLOUCESTER	35	2	0	12.7	F
HUDSON	33	1	0	11.5	F
HUNTERDON	50	2	0	17.7	F
MERCER	44	5	0	17.2	F
MIDDLESEX	52	6	0	20.3	F
MONMOUTH	37	2	0	13.3	F
MORRIS	55	4	0	20.3	F
OCEAN	51	7	0	20.5	F
PASSAIC	29	0	0	9.7	F
UNION	-	-	-	-	-
WARREN	DNC	DNC	DNC	DNC	DNC

PARTICLE POLLUTION DAYS/2005-2007

County	24-Hour					Annual	
	Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/Fail
ATLANTIC	2	1	0	1.2	C	11.5	PASS
BERGEN	11	0	0	3.7	F	13.2	PASS
CAMDEN	17	0	0	5.7	F	13.5	PASS
CUMBERLAND	DNC	DNC	DNC	DNC	DNC	DNC	DNC
ESSEX	10	0	0	3.3	F	13.3	PASS
GLOUCESTER	3	0	0	1.0	C	DNC	INC
HUDSON	19	0	0	6.3	F	14.0	PASS
HUNTERDON	DNC	DNC	DNC	DNC	DNC	DNC	DNC
MERCER	9	0	0	3.0	D	12.5	PASS
MIDDLESEX	3	0	0	1.0	C	12.1	PASS
MONMOUTH	DNC	DNC	DNC	DNC	DNC	DNC	DNC
MORRIS	4	0	0	1.3	C	11.3	PASS
OCEAN	5	0	0	1.7	C	10.7	PASS
PASSAIC	9	0	0	3.0	D	12.9	PASS
UNION	36	0	0	12.0	F	14.5	PASS
WARREN	5	0	0	1.7	C	12.7	PASS

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sums of each level by the assigned standard weights (i.e., 1 for orange, 2 for red, 3 for purple) and calculating the average; (2) Asterisk (*) indicates incomplete monitoring data for all three years. Therefore, these counties are excluded from the grade analysis or marked as incomplete; (3) DNC indicates that data on that particular pollutant is not collected in that county; (4) brackets are as follows: ATLAS, BERGTON, CAMDEN, CHRYSLER, ESSEX, GLOUCESTER, HUDSON, HUNTERDON, MIDDLESEX, MONMOUTH, MORRIS, OCEAN, PASSAIC, UNION, WARREN.

NEW JERSEY

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

NEW YORK

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AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ALBANY	299,307	61,188	40,642	5,563	20,697	8,128	4,033	86,406	18,577
BRONX	1,373,659	387,025	144,266	35,184	85,167	32,337	14,905	332,814	70,239
CHAUTAUQUA	133,945	28,707	21,252	2,610	9,145	3,703	1,951	40,476	8,818
CHEMUNG	88,015	19,347	13,477	1,759	5,978	2,412	1,263	26,288	5,722
DUTCHESS	292,746	65,970	36,677	5,997	19,818	7,767	3,839	82,381	17,723
ERIE	913,338	199,858	141,471	18,169	62,178	25,168	13,259	275,031	59,961
ESSEX	38,119	7,158	6,350	651	2,691	1,093	580	11,986	2,615
FRANKLIN	50,449	9,485	6,677	862	3,550	1,379	668	14,502	3,099
HAMILTON	5,075	848	1,090	77	370	159	93	1,832	409
HERKIMER	62,558	13,312	10,068	1,210	4,289	1,745	929	19,164	4,186
JEFFERSON	117,201	28,862	13,365	2,624	7,587	2,877	1,321	29,574	6,227
KINGS	2,528,050	637,307	307,692	57,938	165,692	63,455	30,635	666,473	142,257
MADISON	69,829	14,743	9,110	1,340	4,801	1,882	931	19,973	4,294
MONROE	729,681	167,562	97,857	15,233	49,087	19,455	9,838	208,542	45,082
NASSAU	1,306,533	301,502	194,619	27,410	88,379	35,998	19,192	395,319	86,610
NEW YORK	1,620,867	273,423	204,078	24,857	116,001	44,125	20,423	455,080	96,056
NIAGARA	214,845	46,837	32,807	4,238	14,675	5,939	3,128	64,886	14,154
ONEIDA	232,304	49,945	36,989	4,541	15,827	6,403	3,370	69,964	15,234

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ONONDAGA	454,010	105,188	61,931	9,563	30,398	12,059	6,108	129,381	27,964
ORANGE	377,169	101,162	37,461	9,197	24,125	9,213	4,305	95,287	20,247
OSWEGO	121,454	27,445	14,338	2,495	8,209	3,184	1,540	33,445	7,159
PUTNAM	99,489	23,571	11,068	2,143	6,734	2,647	1,317	28,129	6,085
QUEENS	2,270,338	485,989	299,388	44,181	154,922	60,582	29,797	641,503	137,609
RENSSELAER	155,318	33,819	20,137	3,074	10,598	4,160	2,063	44,202	9,511
RICHMOND	481,613	114,171	57,621	10,379	32,127	12,538	6,142	132,437	28,439
SARATOGA	215,852	47,726	26,149	4,339	14,713	5,741	2,811	60,628	13,022
SCHENECTADY	150,818	34,541	23,143	3,140	10,126	4,098	2,159	44,786	9,762
ST. LAWRENCE	109,809	22,409	14,804	2,037	7,563	2,950	1,443	31,167	6,671
STEUEN	96,874	21,801	14,898	1,982	6,551	2,656	1,404	29,065	6,343
SUFFOLK	1,453,229	358,691	185,431	32,609	95,965	38,051	19,260	407,911	88,295
ULSTER	181,860	37,615	24,747	3,420	12,630	5,010	2,538	53,734	11,629
WAYNE	91,291	21,797	12,121	1,982	6,112	2,444	1,258	26,404	5,741
WESTCHESTER	951,325	230,588	131,307	20,963	63,088	25,344	13,163	275,008	59,838
TOTALS	17,286,970	3,979,592	2,255,031	361,785	1,157,796	454,702	225,669	4,833,777	1,039,582

NEW YORK

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

NEW YORK

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in New York

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HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg.	Grade
ALBANY	11	0	0	3.7	F
BRONX	12	2	0	5.0	F
CHAUTAUQUA	48	1	0	16.5	F
CHEMUNG	2	0	0	0.7	B
DUTCHESS	15	0	0	5.0	F
ERIE	34	2	0	12.3	F
ESSEX	25	2	0	9.3	F
FRANKLIN	13	0	0	4.3	F
HAMILTON	4	0	0	1.3	C
HERKIMER	3	0	0	1.0	C
JEFFERSON	17	1	0	6.2	F
KINGS	-	-	-	-	-
MADISON	7	0	0	2.3	D
MONROE	19	0	0	6.3	F
NASSAU	DNC	DNC	DNC	DNC	DNC
NEW YORK	-	-	-	-	-
NIAGARA	32	1	0	11.2	F
ONEIDA	3	0	0	1.0	C
ONONDAGA	14	0	0	4.7	F

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
7	0	0	2.3	D	DNC	INC.
31	0	0	10.3	F	15.5	FAIL
3	0	0	1.0	C	9.7	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
11	0	0	3.7	F	12.5	PASS
1	0	0	0.3	B	5.9	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
8	0	0	2.7	D	14.0	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
4	0	0	1.3	C	10.6	PASS
5	0	0	1.7	C	11.4	PASS
15	0	0	5.0	F	15.9	FAIL
8	0	0	2.7	D	11.8	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
1	0	0	0.3	B	9.9	PASS

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg.	Grade
ORANGE	27	2	0	10.0	F
OSWEGO	15	0	0	5.0	F
PUTNAM	23	3	1	9.8	F
QUEENS	19	0	0	6.3	F
RENSSELAER	14	1	0	5.2	F
RICHMOND	33	7	0	14.5	F
SARATOGA	21	0	0	7.0	F
SCHENECTADY	6	0	0	2.0	C
ST. LAWRENCE	DNC	DNC	DNC	DNC	DNC
STEBEN	-	-	-	-	-
SUFFOLK	34	9	1	16.5	F
ULSTER	13	0	0	4.3	F
WAYNE	9	0	0	3.0	D
WESTCHESTER	29	7	0	13.2	F

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
4	0	0	1.3	C	10.8	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
16	0	0	5.3	F	11.8	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
6	0	0	2.0	C	13.2	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
0	0	0	0.0	A	6.9	PASS
3	0	0	1.0	C	8.7	PASS
3	0	0	1.0	C	DNC	INC.
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
4	0	0	1.3	C	11.7	PASS

Notes:

(1) The weighted average was derived by adding the three years of individual test data (2005-2007), multiplying the sums of each test by the assigned standard weights, i.e., Orange: 12 red: 2 Purple: 1 and calculating the average. (2) Asterisk (*) indicates incomplete monitoring data for all three years. Therefore, these counties are excluded from the grade analysis or marked as incomplete. (3) DNC indicates that data on that particular pollutant is not collected as that county. (4) Grades are as follows: A=0.0, B=0.3-0.9, C=1.0-2.0, D=2.1-3.2, F=3.3+.

NEW YORK

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

OHIO

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AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ALLEN	105,233	25,952	15,318	2,359	6,949	2,779	1,448	30,210	6,569
ASHTABULA	101,141	24,069	14,799	2,188	6,733	2,721	1,427	29,666	6,467
ATHENS	63,275	10,488	6,335	953	4,887	1,615	653	15,757	3,209
BUTLER	357,888	89,436	39,670	8,131	23,987	8,992	4,269	93,688	19,956
CLARK	140,477	32,976	21,884	2,998	9,369	3,816	2,032	41,911	9,160
CLERMONT	193,490	50,740	20,784	4,613	12,691	4,838	2,326	50,663	10,840
CLINTON	43,071	10,736	5,422	976	2,870	1,101	543	11,677	2,508
CUYAHOGA	1,295,958	307,509	195,936	27,956	86,090	35,135	18,656	385,273	84,217
DELAWARE	160,865	44,429	13,236	4,039	10,552	3,765	1,646	57,841	7,913
FRANKLIN	118,107	28,567	108,297	25,925	75,107	27,278	12,355	278,434	58,653
GAUGA	96,029	23,251	13,673	2,114	6,197	2,599	1,397	28,642	6,297
GREENE	154,656	33,782	19,321	3,071	10,736	4,107	2,008	43,353	9,297
HAMILTON	842,369	205,266	112,942	18,661	56,046	22,139	11,277	238,097	51,559
JEFFERSON	68,730	13,635	13,066	1,240	4,729	2,023	1,141	22,843	5,057
KNOX	58,961	13,731	8,253	1,248	3,999	1,554	786	16,667	3,596
LAKE	233,392	52,197	34,369	4,745	15,780	6,441	3,396	70,372	15,374
LAWRENCE	62,609	14,424	9,198	1,311	4,232	1,681	870	18,218	3,954
LICKING	156,985	38,555	19,757	3,505	10,449	4,087	2,047	43,611	9,413

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
LOGAN	46,279	11,528	6,444	1,048	3,046	1,218	630	13,193	2,867
LORAIN	302,260	73,577	39,961	6,689	20,132	7,933	4,025	85,158	18,426
LUCAS	441,910	110,939	56,247	10,085	29,254	11,376	5,687	121,307	26,148
MADISON	41,499	9,473	4,996	861	2,855	1,079	520	11,318	2,418
MAHONING	240,420	52,864	41,051	4,806	16,197	6,793	3,735	75,745	16,681
MEDINA	169,832	42,190	19,669	3,835	11,268	4,398	2,174	46,624	10,047
MIAMI	101,038	23,816	14,672	2,165	6,745	2,727	1,429	29,714	6,477
MONTGOMERY	538,104	127,349	78,831	11,577	36,001	14,397	7,495	156,457	34,020
PORTAGE	155,869	33,208	18,043	3,019	10,967	4,102	1,942	42,691	9,087
PREBLE	41,739	9,637	6,071	876	2,804	1,134	594	12,349	2,692
SCIOTO	75,958	17,437	11,688	1,585	5,143	2,039	1,062	22,174	4,814
STARK	378,664	87,280	58,696	7,935	25,341	10,392	5,551	114,267	25,010
SUMMIT	543,487	129,095	75,511	11,736	36,308	14,531	7,507	157,290	34,184
TRUMBULL	213,475	47,170	35,469	4,288	14,383	6,004	3,276	66,697	14,669
UNION	47,234	12,644	4,304	1,149	3,112	1,139	517	11,629	2,454
WARREN	204,390	54,349	19,956	4,941	13,474	4,964	2,286	51,022	10,798
WASHINGTON	61,576	13,166	10,334	1,197	4,194	1,741	947	19,331	4,242
WOOD	125,399	26,464	14,586	2,406	8,880	3,279	1,535	33,965	7,203
TOTALS	8,981,369	2,158,529	1,188,809	196,232	601,504	235,915	119,190	2,527,834	546,275

OHIO

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

OHIO

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Ohio

1950 Arlington Lane
Columbus, OH 43228-4102
(614) 279-1700
www.lungusa.org/ohio

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg.	Grade
ALLEN	26	0	0	8.7	F
ASHTABULA	42	4	0	16.0	F
ATHENS	DNC	DNC	DNC	DNC	DNC
BUTLER	64	5	0	23.8	F
CLARK	32	2	0	11.7	F
CLERMONT	40	0	0	13.3	F
CLINTON	52	1	0	17.8	F
CUYAHOGA	30	2	0	11.0	F
DELAWARE	26	0	0	8.7	F
FRANKLIN	58	2	0	20.3	F
GEAUGA	21	0	0	7.0	F
GREENE	26	0	0	8.7	F
HAMILTON	78	5	0	28.5	F
JEFFERSON	32	0	0	10.7	F
KNOX	22	1	0	7.8	F
LAKE	41	3	1	15.8	F
LAWRENCE	12	0	0	4.0	F
LICKING	20	0	0	6.7	F

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
3	0	0	1.0	C	12.7	PASS
15	0	0	5.0	F	15.6	FAIL
7	0	0	2.3	D	14.8	PASS
5	0	0	1.7	C	14.2	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
20	0	0	6.7	F	16.8	FAIL
DNC	DNC	DNC	DNC	DNC	DNC	DNC
10	0	0	3.3	F	14.9	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
5	0	0	1.7	C	13.6	PASS
22	0	0	7.3	F	17.3	FAIL
14	0	0	4.7	F	16.1	FAIL
DNC	DNC	DNC	DNC	DNC	DNC	DNC
7	0	0	2.3	D	DNC	INC
9	0	0	3.0	D	15.4	FAIL
DNC	DNC	DNC	DNC	DNC	DNC	DNC

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg.	Grade
LOGAN	-	-	-	-	-
LORAIN	11	1	0	4.2	F
LUCAS	34	2	0	12.3	F
MADISON	31	0	0	10.3	F
MAHONING	24	0	0	8.0	F
MEDINA	17	1	0	6.2	F
MIAMI	12	0	0	4.0	F
MONTGOMERY	13	0	0	4.3	F
PORTAGE	35	1	0	12.2	F
PREBLE	13	0	0	4.3	F
SCIOTO	DNC	DNC	DNC	DNC	DNC
STARK	53	2	0	18.7	F
SUMMIT	46	2	0	16.3	F
TRUMBULL	46	0	0	15.3	F
UNION	-	-	-	-	-
WARREN	64	4	0	23.3	F
WASHINGTON	41	1	0	14.2	F
WOOD	17	0	0	5.7	F

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
DNC	DNC	DNC	DNC	DNC	DNC	DNC
3	0	0	1.0	C	13.0	PASS
9	0	0	3.0	D	14.4	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
10	0	0	3.3	F	14.8	PASS
3	0	0	1.0	C	DNC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
12	0	0	4.0	F	15.5	FAIL
6	0	0	2.0	C	13.6	PASS
7	0	0	2.3	D	13.9	PASS
9	0	0	3.0	D	14.8	PASS
5	0	0	1.7	C	16.0	FAIL
9	0	0	3.0	D	14.8	PASS
8	0	0	2.7	D	14.5	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
-	-	-	-	-	DNC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC

Notes:

(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sums of each level by the assigned standard weights (i.e., three-year, 15-year, 25-year), and calculating the average; (2) "Incompletable" indicates incomplete monitoring data for all three years. Therefore, these stations are excluded from the grade analysis or received an "Incompletable"; (3) "DNC" indicates that data on that particular pollutant is not collected at that county; (4) Grades are as follows: A=0.0, B=0.1-0.9, C=1.0-2.0, D=2.1-3.2, F=3.3+.

OHIO

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

OKLAHOMA

American Lung Association in Oklahoma
1010 East 8th Street
Tulsa, OK 74120
(918) 747-3441
www.lungusa.org/oklahoma

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ADAIR	21,902	6,195	2,557	563	1,344	533	261	5,627	1,206
CADDO	29,296	7,560	4,196	687	1,861	759	394	8,236	1,789
CANADIAN	103,559	26,186	10,677	2,381	6,640	2,605	1,254	27,096	5,779
CARTER	47,582	11,901	7,373	1,082	3,059	1,266	676	13,923	3,043
CHEROKEE	45,393	10,725	5,567	975	2,955	1,152	549	12,031	2,558
CLEVELAND	236,452	53,092	21,572	4,827	15,657	5,916	2,590	59,514	12,438
COMANCHE	113,811	32,953	12,110	2,996	6,900	2,675	1,253	27,722	5,876
COTTON	6,299	1,551	976	141	407	168	89	1,843	402
CREEK	69,073	16,701	10,193	1,518	4,496	1,852	976	20,237	4,415
DEWEY	4,338	905	899	82	295	129	76	1,490	333
GARFIELD	57,657	14,594	9,164	1,327	3,690	1,523	825	16,926	3,705
JEFFERSON	6,273	1,449	1,213	132	413	176	100	1,998	442
JOHNSTON	10,402	2,499	1,569	227	678	279	147	3,046	664
KAY	45,638	11,516	7,512	1,047	2,930	1,234	678	13,750	3,027
LATIMER	10,508	2,385	1,708	217	693	283	149	3,092	672
LINCOLN	32,272	7,918	4,659	720	2,091	860	451	9,369	2,042
LOVE	9,112	2,166	1,534	197	596	250	137	2,781	611
MARSHALL	14,830	3,556	2,738	323	963	404	224	4,533	997

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
MAYES	39,627	9,524	6,069	866	2,579	1,060	559	11,588	2,525
MCCLAIN	31,849	7,809	4,152	710	2,060	828	416	8,857	1,911
MUSKOGEE	71,116	17,054	11,008	1,550	4,626	1,897	998	20,726	4,512
OKLAHOMA	701,807	185,702	86,814	16,882	44,137	17,536	8,636	185,796	39,868
OKMULGEE	39,300	9,650	5,902	877	2,541	1,043	549	11,394	2,482
OTTAWA	32,474	7,665	5,465	697	2,122	882	476	9,755	2,135
PITTSBURG	44,711	9,711	7,786	883	2,995	1,247	677	13,826	3,029
SEQUOYAH	41,024	10,121	5,745	920	2,649	1,078	555	11,653	2,528
TULSA	385,068	154,409	70,081	14,037	36,899	14,697	7,240	155,674	33,447
TOTALS	2,451,373	625,497	309,239	56,864	156,275	62,343	30,912	662,481	142,436

OKLAHOMA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

OKLAHOMA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Oklahoma

1010 East 8th Street
Tulsa, OK 74120
(918) 747-3441
www.lungusa.org/oklahoma

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg	Grade
ADAIR	17	0	0	5.7	F
CADDO	*	*	*	*	*
CANADIAN	23	0	0	7.7	F
CARTER	*	*	*	*	*
CHEROKEE	6	1	0	2.5	D
CLEVELAND	21	0	0	7.0	F
COMANCHE	20	0	0	6.7	F
COTTON	*	*	*	*	*
CREEK	20	1	0	7.2	F
DEWEY	7	0	0	2.3	D
GARFIELD	DNC	DNC	DNC	DNC	DNC
JEFFERSON	*	*	*	*	*
JOHNSTON	*	*	*	*	*
KAY	23	0	0	7.7	F
LATIMER	*	*	*	*	*
LINCOLN	*	*	*	*	*
LOVE	*	*	*	*	*
MARSHALL	*	*	*	*	*

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/Fail
DNC	DNC	DNC	DNC	DNC	DNC	DNC
1	0	0	0.3	B	8.6	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
*	*	*	*	*	DNC	INC
2	0	0	0.7	B	12.3	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
2	0	0	0.7	B	10.3	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
*	*	*	*	*	DNC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
2	0	0	0.7	B	10.3	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
*	*	*	*	*	DNC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg	Grade
MAYES	29	0	0	9.7	F
MCCLAIN	7	0	0	2.3	D
MUSKOGEE	*	*	*	*	*
OKLAHOMA	44	0	0	14.7	F
OKMULGEE	*	*	*	*	*
OTTAWA	12	0	0	4.0	F
PITTSBURG	7	0	0	2.3	D
SEQUOYAH	*	*	*	*	*
TULSA	47	2	0	16.7	F

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/Fail
2	0	0	0.7	B	11.8	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
3	0	0	1.0	C	12.0	PASS
0	0	0	0.0	A	10.2	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
0	0	0	0.0	A	12.0	PASS
2	0	0	0.7	B	11.4	PASS
5	0	0	1.7	C	13.0	PASS
6	0	0	2.0	C	11.6	PASS

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sum of each level by the assigned standard weights, i.e., 1/3orange, 1/3red, 2/3purple and calculating the average. (2) A blank (*) indicates incomplete monitoring data for all three years. Therefore, those counties are excluded from the grade analysis or received an incomplete. (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Grades are as follows: A=0.0, B=0.3, C=1.0, D=2.3, E=4.0, F=9.7.

OKLAHOMA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

OREGON

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Oregon
7420 SW Bridgeport Road, Suite 200
Tigard, OR 97224-7711
(503) 924-4094
www.lungusa.org/oregon

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
CLACKAMAS	376,251	85,284	45,573	7,753	28,081	10,151	5,102	108,406	23,474
COLUMBIA	48,996	11,220	5,759	1,020	3,648	1,309	651	13,909	3,003
DOUGLAS	104,119	21,281	20,827	1,935	7,917	3,062	1,756	34,866	7,741
HARNEY	6,767	1,526	1,267	139	501	198	115	2,265	506
JACKSON	199,295	43,134	33,249	3,921	14,987	5,594	3,029	61,927	13,584
JOSEPHINE	81,056	16,469	16,961	1,497	6,165	2,410	1,405	27,658	6,161
KLAMATH	66,512	15,557	10,331	1,414	4,895	1,822	976	20,063	4,395
LAKE	7,277	1,466	1,450	133	555	218	126	2,492	556
LANE	343,591	69,463	48,187	6,315	26,418	9,465	4,780	101,414	21,907
LINN	113,264	26,828	17,053	2,439	8,310	3,044	1,600	33,233	7,241
MARION	311,449	82,763	37,465	7,524	22,072	7,738	3,776	81,644	17,494
MULTNOMAH	701,986	160,395	71,920	14,582	52,425	18,148	8,498	187,816	39,961
UMATILLA	73,491	19,287	9,094	1,753	5,228	1,863	930	19,853	4,279
UNION	24,753	5,339	3,789	491	1,861	683	360	7,464	1,628
WASCO	23,762	5,483	4,108	498	1,752	668	372	7,493	1,655
WASHINGTON	522,514	137,217	47,321	12,474	37,341	12,725	5,788	130,045	27,476
TOTALS	3,005,083	702,772	374,354	63,889	222,155	79,098	39,265	840,548	181,053

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg	Grade
CLACKAMAS	1	1	0	0.8	B
COLUMBIA	0	0	0	0.0	A
DOUGLAS	DNC	DNC	DNC	DNC	DNC
HARNEY	DNC	DNC	DNC	DNC	DNC
JACKSON	3	0	0	1.0	C
JOSEPHINE	DNC	DNC	DNC	DNC	DNC
KLAMATH	DNC	DNC	DNC	DNC	DNC
LAKE	DNC	DNC	DNC	DNC	DNC
LANE	8	0	0	2.7	D
LINN	-	-	-	-	-
MARION	4	0	0	1.3	C
MULTNOMAH	1	0	0	0.3	B
UMATILLA	-	-	-	-	-
UNION	DNC	DNC	DNC	DNC	DNC
WASCO	DNC	DNC	DNC	DNC	DNC
WASHINGTON	DNC	DNC	DNC	DNC	DNC

PARTICLE POLLUTION DAYS/2005-2007

County	24-Hour					Annual	
	Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/Fail
CLACKAMAS	DNC	DNC	DNC	DNC	DNC	DNC	DNC
COLUMBIA	-	-	-	-	-	DNC	INC
DOUGLAS	-	-	-	-	-	DNC	INC
HARNEY	-	-	-	-	-	DNC	INC
JACKSON	6	0	0	2.0	C	10.0	PASS
JOSEPHINE	0	0	0	0.0	A	DNC	INC
KLAMATH	17	0	0	5.7	F	11.2	PASS
LAKE	-	-	-	-	-	DNC	INC
LANE	38	1	0	13.2	F	11.5	PASS
LINN	-	-	-	-	-	DNC	INC
MARION	DNC	DNC	DNC	DNC	DNC	DNC	DNC
MULTNOMAH	5	0	0	1.7	C	9.0	PASS
UMATILLA	-	-	-	-	-	DNC	INC
UNION	2	0	0	0.7	B	8.2	PASS
WASCO	-	-	-	-	-	DNC	INC
WASHINGTON	5	0	0	1.7	C	DNC	INC

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sums of each level by the assigned standard weights, i.e., 1 for orange, 1.5 for red, 2 for purple, and calculating the average. (2) Asterisk (*) indicates incomplete monitoring data for all three years. Therefore, those counties are marked as "DNC" from the grade analysis as received an incomplete. (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Grades are as follows: A=1.0; B=1.3-1.6; C=1.7-2.0; D=2.3-2.6; E=2.7-3.0; F=3.3-3.6.

OREGON

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

PENNSYLVANIA

American Lung Association in Pennsylvania

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Camp Hill, PA 17011
(717) 541-5864
www.lungusa.org/pennsylvania

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ADAMS	100,779	22,604	14,195	2,055	7,358	2,702	1,373	29,035	6,277
ALLEGHENY	1,219,210	253,521	205,511	23,048	88,567	34,705	18,848	384,708	84,479
ARMSTRONG	69,059	13,999	12,735	1,273	4,993	2,015	1,129	22,668	5,012
BEAVER	173,074	35,777	31,630	3,752	12,443	5,029	2,818	56,593	12,516
BERKS	401,955	95,598	56,560	8,691	28,680	10,637	5,447	114,713	24,846
BLAIR	125,527	26,644	21,520	2,422	9,079	3,546	1,929	39,343	8,636
BUCKS	621,144	143,312	84,064	13,029	44,301	16,896	8,762	183,106	39,895
CAMBRIA	144,995	28,199	27,048	2,564	10,648	4,235	2,353	47,483	10,469
CENTRE	144,658	23,511	15,998	2,137	12,016	3,764	1,582	37,307	7,669
CHESTER	486,345	119,360	59,067	10,851	34,435	12,712	6,361	135,531	29,279
CLEARFIELD	81,452	16,213	14,460	1,474	5,987	2,340	1,277	26,014	5,712
CUMBERLAND	228,019	46,679	34,547	4,244	16,927	6,327	3,273	68,561	14,882
DAUPHIN	255,710	60,287	34,950	5,481	18,170	6,873	3,552	74,395	16,182
DELAWARE	554,399	132,836	78,371	12,076	39,288	14,756	7,632	159,838	34,724
ERIE	279,092	64,329	39,904	5,848	20,070	7,480	3,847	80,828	17,528
FRANKLIN	141,665	32,584	23,396	2,962	10,100	3,855	2,061	42,444	9,269
GREENE	39,503	7,880	5,933	716	2,950	1,105	571	11,961	2,597
INDIANA	87,690	16,273	13,826	1,479	6,708	2,463	1,262	26,582	5,747

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
LACKAWANNA	209,330	43,290	37,619	3,935	15,217	5,968	3,277	68,536	14,624
LANCASTER	498,465	125,753	71,955	11,432	34,753	13,026	6,767	141,433	30,724
LAWRENCE	90,991	19,398	16,696	1,763	6,509	2,609	1,458	29,329	6,477
LEHIGH	337,343	79,588	50,971	7,235	23,923	9,081	4,776	99,158	21,608
LUZERNE	312,265	62,461	56,760	5,678	22,884	8,985	4,939	100,227	22,035
LYCOMING	116,811	24,740	19,097	2,249	8,499	3,273	1,751	36,026	7,880
MERCER	116,809	25,170	20,743	2,288	8,381	3,306	1,821	36,906	8,121
MONROE	164,722	40,084	19,314	3,644	11,788	4,256	2,083	44,930	9,649
MONTGOMERY	776,172	180,296	114,326	16,391	55,155	21,119	11,123	230,656	50,348
NORTHAMPTON	293,522	64,674	42,435	5,880	21,372	7,980	4,109	86,274	18,717
PERRY	45,163	10,440	5,713	949	3,245	1,212	613	12,984	2,813
PHILADELPHIA	1,449,634	363,648	186,573	33,059	103,046	36,802	18,128	390,049	83,636
TIOGA	40,681	8,492	7,079	772	2,962	1,149	624	12,740	2,793
WASHINGTON	205,553	42,168	35,282	3,833	14,952	5,892	3,219	65,498	14,402
WESTMORELAND	362,326	71,731	66,171	6,521	26,341	10,643	5,952	119,641	26,455
YORK	421,049	97,661	57,226	8,878	30,222	11,270	5,758	121,361	26,307
TOTALS	10,595,112	2,399,190	1,581,675	218,111	761,927	288,010	150,473	3,134,858	682,305

PENNSYLVANIA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

PENNSYLVANIA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Pennsylvania
3001 Ole Gettysburg Road
Camp Hill, PA 17011
(717) 541-5864
www.lungusa.org/pennsylvania

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg.	Grade
ADAMS	26	0	0	8.7	F
ALLEGHENY	52	5	0	19.8	F
ARMSTRONG	43	3	0	15.8	F
BEAVER	35	2	0	12.7	F
BERKS	32	0	0	10.7	F
BLAIR	7	0	0	2.3	D
BUCKS	47	4	2	19.0	F
CAMBRIA	8	0	0	2.7	D
CENTRE	15	0	0	5.0	F
CHESTER	45	2	1	16.7	F
CLEARFIELD	15	0	0	5.0	F
CUMBERLAND	DNC	DNC	DNC	DNC	DNC
DAUPHIN	35	0	0	11.7	F
DELAWARE	34	1	0	11.8	F
ERIE	30	3	0	11.5	F
FRANKLIN	7	0	0	2.3	D
GREENE	32	0	0	10.7	F
INDIANA	29	0	0	9.7	F

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
17	0	0	5.7	F	12.6	PASS
147	13	0	55.5	F	19.8	FAIL
DNC	DNC	DNC	DNC	DNC	DNC	DNC
14	0	0	4.7	F	16.5	FAIL
13	0	0	4.3	F	DNC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
8	0	0	2.7	D	13.2	PASS
10	0	0	3.3	F	15.3	FAIL
23	0	0	7.7	F	12.2	PASS
5	0	0	1.7	C	DNC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
27	0	0	9.0	F	13.9	PASS
29	0	0	9.7	F	14.6	PASS
10	0	0	3.3	F	15.0	PASS
22	1	0	7.8	F	12.6	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg.	Grade
LACKAWANNA	18	0	0	6.0	F
LANCASTER	45	1	0	15.5	F
LAWRENCE	8	0	0	2.7	D
LEHIGH	33	0	0	11.0	F
LUZERNE	16	0	0	5.3	F
LYCOMING	15	0	0	5.0	F
MERCER	40	1	0	13.8	F
MONROE	-	-	-	-	-
MONTGOMERY	49	0	0	16.3	F
NORTHAMPTON	28	1	0	9.8	F
PERRY	18	0	0	6.0	F
PHILADELPHIA	54	6	0	21.0	F
TIOGA	10	0	0	3.3	F
WASHINGTON	31	0	0	10.3	F
WESTMORELAND	23	1	0	8.2	F
YORK	37	1	0	12.8	F

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
13	0	0	4.3	F	11.5	PASS
16	0	0	5.3	F	15.9	FAIL
DNC	DNC	DNC	DNC	DNC	DNC	DNC
-	-	-	-	-	DNC	INC
-	-	-	-	-	DNC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
17	0	0	5.7	F	13.0	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
6	0	0	2.0	C	DNC	INC
25	0	0	8.3	F	13.4	PASS
-	-	-	-	-	DNC	INC
33	0	0	11.0	F	DNC	INC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
35	0	0	11.7	F	15.5	FAIL
11	0	0	3.7	F	15.5	FAIL
15	0	0	5.0	F	16.0	FAIL

Notes:
(1) The weighted average was derived by adding the 11-year sums of individual level data (2005-2007), multiplying the sums of each level by its assigned standard weight, i.e., 13 for orange, 22 for purple and calculating the average. (2) A dash (-) indicates incomplete monitoring data for all three years. Therefore, those counties are excluded from the grade analysis or received an incremental (-). (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Grades are as follows: A=10, B=13, C=16, D=19, E=22, F=25.

PENNSYLVANIA

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

RHODE ISLAND

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Rhode Island

260 West Exchange Street, Suite 102-B
 Providence, RI 02903
 (401) 421-6487
www.lungusa.org/rhodesland

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
KENT	168,639	35,723	24,625	3,248	12,929	4,702	2,459	5,176	11,159
PROVIDENCE	629,435	145,180	83,711	13,398	47,548	16,445	8,128	174,554	37,462
WASHINGTON	126,902	25,797	17,314	2,345	9,886	3,523	1,790	37,835	8,197
TOTALS	924,976	206,700	125,650	18,791	70,363	24,670	12,377	263,565	56,819

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg	Grade
KENT	22	3	0	8.8	F
PROVIDENCE	22	1	0	7.8	F
WASHINGTON	30	2	1	11.7	F

PARTICLE POLLUTION DAYS/2005-2007

County	24-Hour					Annual	
	Orange	Red	Purple	Wgt. Avg	Grade	Design Value	Pass/Fail
KENT	2	0	0	0.7	B	DNC	INC
PROVIDENCE	8	0	0	2.7	D	12.0	PASS
WASHINGTON	DNC	DNC	DNC	DNC	DNC	DNC	DNC

Notes:
 (1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sums of each level by the assigned standard weight (i.e. Orange= 15/mid, 20/mid and calculating the average. (2) Asterisk (*) indicates incomplete monitoring data for all three years. Therefore these counties are excluded from the grade analysis or received an Incomplete. (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Grades are as follows: A=0.0, B=0.3-0.9, C=1.0-2.0, D=2.1-3.2, F=3.3+.

RHODE ISLAND

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

TENNESSEE

American Lung Association in Tennessee

One Vantage Way, Suite B-130
Nashville, TN 37228
(615) 329-1151
www.lungusa.org/tennessee

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ANDERSON	73,471	16,157	12,247	1,469	4,994	2,063	1,123	22,889	5,029
BLOUNT	119,855	26,426	17,666	2,402	8,103	3,266	1,692	35,410	7,691
BRADLEY	95,443	21,893	12,772	1,990	6,354	2,516	1,255	26,818	5,772
COFFEE	51,741	12,428	8,192	1,130	3,403	1,386	736	15,203	3,316
DAVIDSON	619,626	145,918	67,807	13,265	40,880	15,807	7,436	164,022	34,870
DICKSON	47,366	12,118	5,827	1,102	3,051	1,206	597	12,799	2,753
DYER	37,684	9,279	5,203	844	2,466	992	511	10,722	2,327
GILES	29,024	6,435	4,464	585	1,965	801	424	8,771	1,916
HAMBLEN	61,829	14,462	9,191	1,315	4,096	1,649	854	17,876	3,878
HAMILTON	330,168	73,899	47,435	6,718	22,295	9,009	4,678	97,747	21,266
HAYWOOD	19,126	4,885	2,592	444	1,237	497	256	5,372	1,166
HUMPHREYS	18,173	4,136	2,920	376	1,220	500	269	5,517	1,208
JEFFERSON	50,221	11,123	7,268	1,011	3,373	1,344	682	14,441	3,117
KNOX	423,874	94,055	53,860	8,551	28,537	11,248	5,539	119,130	25,590
LAWRENCE	40,887	10,177	6,401	925	2,655	1,079	571	11,817	2,574
LOUDON	45,448	9,730	9,041	885	3,096	1,302	739	14,759	3,263
MADISON	96,518	24,403	11,848	2,218	6,240	2,462	1,215	28,094	5,608
MAURY	79,966	19,611	9,728	1,801	5,216	2,062	1,020	21,871	4,706

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
MCMINN	52,131	11,928	7,950	1,084	3,488	1,415	743	15,443	3,364
MEIGS	71,657	2,722	1,510	247	776	309	156	3,311	716
MONTGOMERY	154,460	44,431	12,914	4,039	9,436	3,537	1,540	35,504	7,407
OBION	31,633	7,154	5,149	650	2,133	879	476	9,733	2,137
PUTNAM	69,916	15,581	9,983	1,416	4,660	1,835	910	19,520	4,184
ROANE	53,399	10,989	9,105	999	3,699	1,532	838	17,036	3,748
RUTHERFORD	241,462	64,114	19,218	5,829	15,383	5,634	2,385	55,898	11,585
SEVIER	83,527	18,604	12,193	1,691	5,633	2,270	1,175	24,604	5,344
SHELBY	910,100	249,090	90,883	22,645	57,331	22,283	10,563	231,859	49,474
SULLIVAN	153,519	31,876	26,661	2,898	10,609	4,405	2,422	49,121	10,818
SUMNER	152,721	37,526	17,727	3,411	10,000	3,939	1,930	41,601	8,939
WILLIAMSON	166,128	43,298	14,475	3,936	10,740	4,178	1,966	43,284	9,254
WILSON	106,356	26,591	11,315	2,417	6,931	2,712	1,304	28,396	6,082
TOTALS	4,427,429	1,081,244	533,545	98,296	289,804	114,119	56,002	1,206,568	259,101

TENNESSEE

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

TENNESSEE

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Tennessee

 One Vantage Way, Suite B-130
 Nashville, TN 37228
 (615) 329-1151
www.lungusa.org/tennessee

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg.	Grade
ANDERSON	30	1	0	10.5	F
BLOUNT	77	1	0	26.2	F
BRADLEY	-	-	-	-	-
COFFEE	-	-	-	-	-
DAVIDSON	24	2	0	9.0	F
DICKSON	-	-	-	-	-
DYER	-	-	-	-	-
GILES	-	-	-	-	-
HAMBLETON	-	-	-	-	-
HAMILTON	46	3	0	16.8	F
HAYWOOD	-	-	-	-	-
HUMPHREYS	-	-	-	-	-
JEFFERSON	42	2	0	15.0	F
KNOX	70	0	1	24.0	F
LAWRENCE	-	-	-	-	-
LOUDON	60	1	0	20.5	F
MADISON	DNC	DNC	DNC	DNC	DNC
MAURY	DNC	DNC	DNC	DNC	DNC

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
DNC	DNC	DNC	DNC	DNC	DNC	DNC
8	0	0	2.7	D	14.7	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
22	0	0	7.3	F	14.3	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
7	0	0	2.3	D	12.6	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
13	0	0	4.3	F	15.2	FAIL
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
21	0	0	7.0	F	15.7	FAIL
4	0	0	1.3	C	12.1	PASS
6	0	0	2.0	C	15.7	FAIL
6	0	0	2.0	C	DNC	INC
6	0	0	2.0	C	13.5	PASS

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg.	Grade
MCMINN	DNC	DNC	DNC	DNC	DNC
MEIGS	33	1	0	11.5	F
MONTGOMERY	-	-	-	-	-
OBION	-	-	-	-	-
PUTNAM	-	-	-	-	-
ROANE	-	-	-	-	-
RUTHERFORD	13	1	0	4.8	F
SEVIER	79	0	0	26.3	F
SHELBY	60	4	0	22.0	F
SULLIVAN	38	3	0	14.2	F
SUMNER	60	3	0	21.5	F
WILLIAMSON	26	0	0	8.7	F
WILSON	34	0	0	11.3	F

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg.	Grade	Design Value	Pass/Fail
6	0	0	2.0	C	14.7	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
18	0	0	6.0	F	13.9	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
6	0	0	2.0	C	DNC	INC
0	0	0	0.0	A	14.8	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC
22	0	0	7.3	F	13.8	PASS
4	0	0	1.3	C	14.5	PASS
7	0	0	2.3	D	13.8	PASS
DNC	DNC	DNC	DNC	DNC	DNC	DNC
DNC	DNC	DNC	DNC	DNC	DNC	DNC

Notes:
 (1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sum of each level by the assigned standard weights, i.e. the range 15 (red), 20 (purple) and calculating the average. (2) A broken "X" indicates incomplete monitoring data for all three years. Therefore, those counties are excluded from the grade analysis or received an "Inc." grade. (3) DNC indicates that data for that particular pollutant was not collected in that county. (4) Grades are as follows: A=0.0, B=1.3-3.9, C=4.0-2.0, D=2.1-3.2, F=3.3+.

TENNESSEE

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

VERMONT

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Vermont
 372 Hurricane Lane, Suite 101
 Williston, VT 05495
 (802) 876-6500
www.lungusa.org/Vermont

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
ADDISON	36,760	7,927	4,374	721	2,756	994	491	10,532	2,270
BENNINGTON	36,452	7,448	6,582	677	2,696	1,063	594	11,947	2,642
CHITTENDEN	151,826	32,666	15,919	2,970	11,492	3,998	1,877	41,425	8,819
RUTLAND	63,270	12,555	10,180	1,141	4,756	1,829	987	20,201	4,438
TOTALS	288,308	60,596	37,055	5,509	21,700	7,884	3,949	84,104	18,169

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg. Grade	
				DNC	DNC
ADDISON	DNC	DNC	DNC	DNC	DNC
BENNINGTON	7	0	0	2.3	D
CHITTENDEN	5	0	0	1.7	C
RUTLAND	DNC	DNC	DNC	DNC	DNC

PARTICLE POLLUTION DAYS/2005-2007

24-Hour					Annual	
Orange	Red	Purple	Wgt. Avg. Grade		Design Value	Pass/Fail
			DNC	DNC		
ADDISON	1	0	0	0.3	B	PASS
BENNINGTON	3	0	0	1.0	C	PASS
CHITTENDEN	2	0	0	0.7	B	PASS
RUTLAND	DNC	DNC	DNC	DNC	DNC	DNC

Notes:
 (1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sum of each level by the assigned standard weights, or: 15 for 1, 10 for 2, 5 for 3, and 1 for 4, and then dividing the sum by the total weight (30).
 (2) Asterisk (*) indicates incomplete data for all three years. Therefore, these counties are excluded from the grade analysis or reported as incomplete. (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Grades are as follows: A=0.0, B=0.1-0.9, C=1.0-2.0, D=2.1-3.2, F=3.3+.

VERMONT

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

WYOMING

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |

American Lung Association in Wyoming

825 Helena Avenue
Helena, MT 59601-3459
(406) 442-6556 ext. 12
www.lungusa.org/wyoming

AT-RISK GROUPS

County	Total Population	Under 18	65 & Over	Lung Diseases				CV Disease	Diabetes
				Pediatric Asthma	Adult Asthma	Chronic Bronchitis	Emphysema		
CAMPBELL	40,433	11,002	2,312	1,000	2,387	961	410	9,539	1,996
CONVERSE	12,868	3,051	1,617	277	786	347	178	3,735	813
FREMONT	37,479	9,324	5,397	848	2,260	998	526	10,905	2,381
LARAMIE	86,353	22,112	10,428	2,010	5,199	2,197	1,085	23,298	5,010
SHERIDAN	27,998	6,170	4,353	561	1,745	786	423	8,668	1,903
SUBLETTE	7,925	1,855	846	169	489	209	101	2,193	471
SWEETWATER	39,305	10,389	3,255	944	2,333	975	451	10,029	2,136
TETON	20,002	3,952	1,671	359	1,301	531	238	5,386	1,137
UINTA	20,195	5,780	1,668	525	1,161	489	229	5,049	1,078
TOTALS	292,558	73,635	31,547	6,694	17,660	7,492	3,640	78,801	16,924

HIGH OZONE DAYS/2005-2007

County	Orange	Red	Purple	Wgt. Avg	Grade
CAMPBELL	4	0	0	1.3	C
CONVERSE	DNC	DNC	DNC	DNC	DNC
FREMONT	-	-	-	-	-
LARAMIE	DNC	DNC	DNC	DNC	DNC
SHERIDAN	DNC	DNC	DNC	DNC	DNC
SUBLETTE	3	0	0	1.0	C
SWEETWATER	-	-	-	-	-
TETON	1	0	0	0.3	B
UINTA	-	-	-	-	-

PARTICLE POLLUTION DAYS/2005-2007

County	24-Hour				Wgt. Avg	Grade	Annual	
	Orange	Red	Purple	Wgt. Avg			Design Value	Pass/Fail
CAMPBELL	0	0	0	0.0	A		DNC	INC
CONVERSE	0	0	0	0.0	A		DNC	INC
FREMONT	1	0	0	0.3	B		76	PASS
LARAMIE	0	0	0	0.0	A		43	PASS
SHERIDAN	1	0	0	0.3	B		95	PASS
SUBLETTE	1	0	0	0.3	B		DNC	INC
SWEETWATER	DNC	DNC	DNC	DNC	DNC		DNC	DNC
TETON	1	0	0	0.3	B		DNC	INC
UINTA	DNC	DNC	DNC	DNC	DNC		DNC	DNC

Notes:
(1) The weighted average was derived by adding the three years of individual level data (2005-2007), multiplying the sums of each level by the assigned standard weights (i.e. Orange: 15, Red: 20, Purple: 30) and calculating the average. (2) Asterisk (*) indicates incomplete monitoring data for all three years. Therefore, these counties are excluded from the grade analysis or received an inconclusive. (3) DNC indicates that data on that particular pollutant is not collected in that county. (4) Grades are as follows: A=0.0, B=0.3-0.9, C=1.0-2.0, D=2.1-3.2, F=3.3+.

WYOMING

AMERICAN LUNG ASSOCIATION STATE OF THE AIR 2009 |



April 15, 2010

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The Hon. Barbara Boxer
Chairman,
Committee on Environment and Public
Works
U.S. Senate
Washington, DC 20510

The Hon. James Inhofe
Ranking Member
Committee on Environment and Public
Works
U.S. Senate
Washington, DC 20150

Dear Chairman Boxer and Ranking Member Inhofe:

Thank you for the opportunity to testify in support of S. 2995, the Clean Air Act Amendments of 2010 on March 4, 2010. On behalf of the American Lung Association, I am pleased to respond to Senator Cardin's question:

Would the American Lung Association support more stringent clean air standards than those set in S. 2995?

The American Lung Association supports maximizing the reductions of air pollution in the legislation. We support the caps in S. 2995 because they would provide dramatic and significant health benefits. We support S. 2995 because it provides a Congressional mandate to clean up these dangerous emissions from some of the nation's largest sources. We would not support changes that weaken the bill or any changes that would result in the legislation not moving forward.

One of the bill's strengths is that it preserves the authority of the U.S. Environmental Protection Agency and the states to drive more reductions and enforce the Clean Air Act. Further, the bill clearly gives EPA the authority to tighten the pollution caps if needed to protect health or the environment. Sections 417, 418 and 419 grant EPA the authority to tighten the nitrogen oxide caps for the ozone season and the annual caps for nitrogen oxide and sulfur dioxide in 2020 and 2021 respectively.

The American Lung Association looks forward to working with the Committee on this lifesaving legislation.

Sincerely yours,

Albert A. Rizzo, M.D. FACP, FCCP, D'ABSM
Board of Directors
American Lung Association

Senator CARPER. Dr. Rizzo, thank you very much. Thanks for what you do with your life and looking out for the health of so many of us in the First State.

Dr. Durham, welcome. It is good to see you again. Thanks for joining us. Please proceed.

**STATEMENT OF MICHAEL D. DURHAM, PH.D., MBA,
PRESIDENT AND CEO, ADA ENVIRONMENTAL SOLUTIONS**

Mr. DURHAM. Good morning. I am Mike Durham, President of ADA Environmental Solutions. I would like to thank Senator Carper and the Committee for inviting me to update you on the status of commercial mercury control technology.

ADA is a company that develops and commercializes emission control technologies for the power industry. We have been involved in mercury control since the early 1990s and have recently installed over 50 mercury control systems at coal-fired power plants generating over 20,000 megawatts of electric power.

We are currently constructing what is to be the largest and cleanest activated carbon production facility ever built to provide high quality, U.S. produced activated carbon to the power industry. The plant, which is located in northwest Louisiana, is scheduled to begin producing activated carbon in the spring.

To provide you with a quick summary of the status of commercial mercury control technology, I would like to focus on the following points.

The commercial market is well underway with over 150 contracts awarded to date for mercury-specific control technologies driven by regulations in 19 States for existing power plants and Federal regulations on new power plants.

The accelerated development of mercury control technology has been a major success story with significant improvements in technologies resulting in higher mercury capture at lower costs. One such advancement was the use of bromine enhancements to enable high efficiency reduction of mercury emissions from western coals at relatively low costs.

As highlighted by the recent GAO report, multiple control technologies are now commercially available to meet the needs for controlling mercury from different coals and from various equipment configurations.

Another important facet of mercury control is the fate of the mercury once it has been captured. DOA and EPA have conducted a number of extensive studies on this issue and confirm that once the mercury is captured onto fly ash, scrubber sludge, or activated carbon it does not leach out of these materials, and therefore is effectively removed from the environment.

I should point out that there are still challenges remaining in mercury control, especially for high sulfur bituminous coals. These provide additional opportunities for technology innovations and further cost reductions.

I commend the Committee for addressing mercury in a multi-pollutant approach as this takes advantage of mercury capture that can be achieved as a co-benefit with other emission control systems. Therefore, costs can be minimized under a regulatory framework in which decisions about mercury control can be integrated

with decisions to control emissions of sulfur dioxide, nitrogen oxide and fine particles.

You should also be aware that all power plants are not the same, and because of the differences in the age, location and design of the 1,100 plants in the U.S. fleet there will be significant plant-by-plant variations in the costs and technical difficulties of achieving high levels of emission control.

However, flexibility in the mercury control regulation can be used to address these differences in plant configurations and operations with the benefits of reducing overall costs of implementation, overcoming technical challenges of the most difficult applications, minimizing impacts on the reliability of electricity supply, while obtaining overall high mercury removal.

Flexibility can be as simple as allowing two plants operating side by side, one achieving 85 percent mercury reduction and the other 95 percent reduction, to average their missions to meet compliance. This would achieve the same environmental benefit while potentially saving the plant tens of millions of dollars. The recent mercury control regulations enacted in a number of States provide good examples of providing flexibility in the form of safety valves, phase in periods, and averaging between plants.

Let me conclude by stating that the regulations provide certainty that drive investments, innovations, cost reductions and the implementation of emission control technology. Certainty in a mercury control regulation will also impact growth of new jobs as previous regulations of other pollutants.

In response to State regulations, ADA began building our first activated carbon plant that created close to \$400 million of construction jobs in an economically depressed parish in Louisiana. We estimate that a 90 percent mercury control regulation would require capital investments for additional activated carbon plants, creating \$2 billion in construction costs and additional high quality operating jobs to run the new facilities as well as mining jobs to supply the feedstock material to make the activated carbon.

In order to finance these operations, it will be necessary to have certainty in the regulations. Building a large scale activated carbon plant is a 3- to 5-year process which must begin prior to the regulation. However, construction cannot begin until the regulations are final. We have found that obtaining debt financing is challenging when lenders are concerned that the EPA regulation creating the market for the product could disappear as a result of legal challenges as was the case with CAMR.

I thank you.

[The prepared statement of Mr. Durham follows:]



Written Testimony of

Dr. Michael D. Durham
President and CEO
ADA Environmental Solutions
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 (303) 734-1727

Before the Senate Committee on Environment and Public Works
Legislative Hearing: S. 2995, The Clean Air Act Amendments of 2010

March 4, 2010
 Dirksen Senate Building Room 406

Senator Boxer, Senator Carper, Senator Inhofe, Senator Vitter and Members of the Committee:

Good morning, I am Dr. Michael Durham, President and CEO of ADA Environmental Solutions (ADA-ES). ADA-ES is a company that develops and commercializes air pollution control technologies for the power industry. We have been involved in mercury control since the early 1990's and currently supply activated carbon injection systems, activated carbon (AC), mercury measurement instrumentation, and related services. To meet the needs of the power industry for mercury control, the Company is developing state-of-the-art facilities to produce activated carbon with our first plant projected to come on-line in 2010. Additionally, the Company is developing technologies for power plants to address issues related to the emissions of carbon dioxide.

I would like to thank Senators Boxer, Carper, Inhofe, and Vitter for the invitation to participate in this hearing on the Clean Air Act Amendments of 2010. It is my privilege to present this testimony on our current understanding of commercial technologies to control emissions of mercury. In this testimony, I would like to focus on the following key points:

- ADA believes that the continued reliance on coal for a significant portion of our electrical power generation is critical to both our economy and natural security. We are working with the electric power industry to develop clean coal technology to maintain progress demonstrated over the past decades toward burning coal with significantly lower emissions.
- Regulations provide certainty that drive investments, innovation, cost reductions, and implementation of emission control technology.

- The accelerated development of mercury control technology has been a major success story with significant improvements in technologies resulting in higher mercury capture efficiencies and lower costs.
- Because of differences in the age, location, and design of the 1100 plus plants in the US coal-fired generating fleet, there will be differences in the costs and difficulties of achieving high levels of emissions control at each plant.
- The commercial mercury control market is well under way with over 150 contracts awarded to date for mercury specific control technologies driven by new regulations in nineteen states, as well as existing Federal regulations on new power plants.
- Multiple control technologies are now commercially available to meet the needs for controlling mercury from different coals and various equipment configurations.
- Mercury control technologies can also take advantage of co-benefits with other air pollution control equipment for criteria pollutants. Therefore, costs can be minimized under a multi-pollutant regulatory framework in which decisions about mercury control can be integrated with decisions to address control of sulfur dioxide, nitrogen oxides, and fine particles.
- There are still challenges remaining that provide additional opportunities for technology innovations and further cost reductions.
- Flexibility in a mercury control regulation can be used to address differences in plant by plant operations resulting in reducing overall costs of implementation, overcoming technical challenges of the most difficult applications, and minimizing potential impacts on the reliability of electrical supply, while still obtaining overall high mercury removal. The recent mercury control regulations enacted in a number of states provide good examples of providing flexibility in the form of safety valves, phase in periods, and averaging between plants.

Regulations Drive Technology Investment, Innovation, and Implementation

As you should be aware, air pollution control technologies follow and respond to regulatory drivers. The synergies of state-specific actions and federal requirements have created control technology markets with considerable certainty as to when and what technologies will be needed. These regulations drive implementation of emission control technology; stimulate innovation to overcome operating issues, ultimately resulting in improved reliability, increase emission reductions, and lower costs.

We can look at the history of air pollution control technology for coal-fired power plants over the past 40 years and see that the regulations for SO₂, NO_x, and particulates have led to continuous improvements in the technology resulting in more effective pollutant removal and lower costs.

There are two primary reasons why regulations are the drivers of innovation in emission control technology. The first is due to the fact that the power generation industry has to operate under very tight cost structures. For the regulated producers, their operating

expenses and capital budgets are fixed by PUCs. For the non-regulated producers they have to compete on the open market for a commodity. In both cases, they make decisions within a business environment in which they cannot economically justify the addition of new emission control equipment unless they are mandated by regulations. Therefore, from the perspective of manufacturers of emission control technologies, without a market for a product, there is no incentive to invest in a new technology or improvements of an existing technology.

In the early stages of technology development, government supported R&D is critical to overcoming the "chicken and egg" dilemma in which there is no control technology on which to base a regulation and without a regulation there is no incentive for private industry to invest in the development of the control technology. For example, progress made to date on the rapid development of commercial mercury control technology has been the result of funding from the DOE National Energy Technology Laboratory (NETL), which was supplemented by funding from the Electric Power Research Institute (EPRI) and directly from power companies to support over 40 full-scale demonstrations of mercury control technology.

The success of this mercury control program provides evidence of how R&D funding can be effectively used to stimulate the development of clean coal technology. It also shows how such funding in the early development stages provides a huge highly leveraged return to the American people.

The Federal funding reduces the risk to the technology developer, including both technology risk and the risk that no market is created for potential future sales. Once the technology has been proven, regulations can be put in place, and then the market forces can take over with further investment by the private sector.

The second reason that regulations drive innovation is that most improvements in emission control technologies result after the equipment has been installed and operated. Again looking at past history, there has been a consistent pattern of installing new emission control technology, discovery of operating issues and side effects, followed by competition among equipment providers for the development of innovative solutions to the problems that can then be incorporated throughout the industry. Therefore, once the regulations drive the installation of new equipment, improvements follow.

We have already seen examples of cost reductions for mercury control that have resulted from operating experience gained after installation of ACI equipment. In 2004, the difficulties related to capturing mercury from western coals resulting in cost estimates in excess of \$100,000 per pound of mercury removed. Control at a 90% level was not achievable for many plants burning Western fuels. However, technology developers working in concert with their power producing customers discovered the root cause of this limitation, then they developed new chemically-treated sorbents to overcome the problem, and now 90% control of mercury from power plants burning Western coals is readily achievable at costs under \$10,000 per pound of mercury removed. Future cost reductions are likely to occur with the development of improved sorbents designed to overcome other limitations such as higher operating temperatures, reduced interference with acid gases, and reduced impact on the sale of flyash with AC for use in concrete.

Multiple Technologies Are Available for Reducing Mercury Emissions

There are many approaches that can be taken to achieve mercury emission reductions depending on the stringency of the regulatory requirement and the boiler's operating parameters (e.g. coal type, existing emissions control systems, boiler size). Technology demonstrations have proven that significant amounts of mercury are being removed through the use of existing control technologies. Installed technologies including fabric filters, electrostatic precipitators, flue gas desulfurization, selective catalytic reduction, and others currently achieve high levels of mercury reductions. Although these processes were not originally intended, designed, nor optimized for mercury capture, the collateral mercury control is often sufficient to meet current requirements. Because mercury is captured as a co-benefit from these control technologies, the reductions are cost effective.

Recent clean air regulations for coal-fired power plants have required the installation of a significant number of flue gas desulfurization systems on coal-fired boilers to reduce emissions of SO₂. Approximately one-third of the coal-fired power plant capacity has some form of FGD installed and an additional one-third of the units are expected to have FGD systems installed by 2015. Wet flue gas desulfurization systems or wet scrubbers are able to simultaneously capture soluble mercury as a co-benefit of the SO₂ control process.

Additional mercury control can be achieved by modifying these emission control technologies to enhance their operation to capture mercury. Enhancing the performance of flue gas desulfurization systems provides one method of achieving mercury control with existing emissions control equipment. The mercury that is captured in the FGD is in the form of oxidized mercury, which is soluble in liquids. The extent of capture varies based on a number of parameters but can be enhanced with the addition of chemicals to the wet scrubber and/or through the oxidation of mercury as it passes through a selective catalytic reduction system situated upstream of the wet scrubber. Full-scale test results have demonstrated greater than 90 percent mercury removal from coal-fired power plants with SCR and wet scrubber emissions control combinations for certain coal types. Co-benefit control of mercury through a wet-FGD is likely the least cost option as a minimal amount of new capital equipment is required to achieve enhanced mercury removal.

For other mercury control options, elemental mercury can be converted to oxidized mercury so that the mercury is more easily captured in downstream air pollution control equipment. A number of these approaches are being tested and deployed today. One example of a mercury oxidizing technology that will provide additional mercury reductions is with the addition of an oxidation catalyst upstream of a wet scrubber. The catalyst oxidizes elemental mercury to oxidized mercury, which is more readily captured in liquids such as those found in wet scrubber processes. The oxidation catalyst can be installed upstream of an SCR system or as an alternative to installing an SCR system. The mercury oxidation technologies mentioned above provide a few examples of mercury control approaches that can enhance mercury capture and optimize control costs.

Mercury Specific Control Technology

Concerning mercury specific control technologies, activated carbon injection (ACI) has been successfully applied in the United States and Europe on waste-to-energy plants for

over a decade with the technology being transferred to coal-fired power plants in the U.S. today. The technology injects activated carbon upstream of a particulate collection device and has demonstrated mercury emission reductions as high as 80 to 95 percent.

The technology, which is shown installed at a power plant in Figure 1, is relatively simple in comparison to typical emission control equipment such as the SO₂ scrubber and fabric filter shown in the photograph. An ACI system consists of a storage silo for the activated carbon and pneumatic conveying system that injects the activated carbon at a controlled feed rate at the desired locations in the ductwork prior to the particulate control device. The mercury reacts with the particulate sorbent which is then removed in the particle control device along with the flyash. Tests have shown that the mercury is not leachable from the sorbent so that it can be disposed of in a landfill without concern for contamination of waterways. Because of their simplicity and small size, ACI systems can be retrofitted on virtually any power plant with minimal engineering. In most cases, installations can be completed in as little as nine months after an order is placed. ACI technology has been tested at full-scale on over 50 coal-fired boilers in the U.S. under the Department of Energy's demonstration program and through the Electric Power Research Institute (EPRI) and other self-funded electric power industry initiatives. Because of the extensive number of full-scale demonstrations on a variety of power plants burning different coals with a broad range of equipment configurations, we now have more full scale operating and performance data on activated carbon injection technology for coal-fired power plants than was available in past instances for any other emissions control technology, such as selective catalytic reduction, prior to the development of regulations by state and federal clean air agencies.

In general, the science and understanding of mercury control technology has moved rapidly from research through development, demonstration and into full system deployment. The success of this rapid progression is the result of strong support from federal and public-private partnerships, and the ability of regulators, particularly in the states, to enact regulatory programs that harnessed the suite of control options in a flexible regulatory framework. For example, the strong research and demonstration program conducted through the U.S. Department of Energy overturned the previous assumption that sub-bituminous coals would be the most difficult and expensive to control. This issue was highlighted in a January 2005 report by the Energy Information Administration report to the Senate Environment and Public Works Committee entitled "Analysis of Alternative Mercury Control Strategies". In this report, EIA projected that mercury control regulations could increase electricity prices by as much as 2.5 cents per kW-hr. because of difficulties in treating mercury from Western coals. As a result, the report concluded that a 90% mercury control regulation would increase resource costs by \$358 billion.

Through these demonstration programs, the better understanding of western, sub-bituminous coals led to successes in dramatically reducing the cost of controlling mercury emissions while increasing the control effectiveness. With the improvements in technology developed under DOE and EPRI funding, the most recent cost analyses by both EPA and DOE suggest that the costs will be only a small fraction of the earlier EIA estimates. Today, technology vendors are addressing challenging issues surrounding sorbent injection technology as it applies to eastern, bituminous coals, particularly in the presence of sulfur trioxides (SO₃).

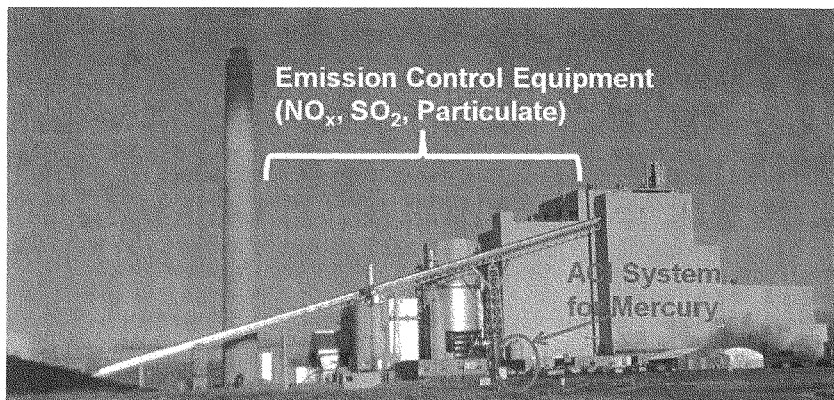


Figure 1. Activated Carbon Injection System Capable of Achieving 90% Capture of Mercury Emissions at a Power Plant.

Other innovations have also occurred to address specific issues. Given that a number of power plants sell flyash that is captured in a particulate control device such as an electrostatic precipitator, the presence of activated carbon in flyash became a challenge. To avoid the potential loss of flyash sales to the concrete industry, the Electric Power Research Institute (EPRI) developed two control systems to meet these challenge, TOXECON™ and TOXECON II™. TOXECON allows flyash to be collected by the electrostatic precipitator, and then injects the sorbent downstream where it is collected in a fabric filter. This preserves the flyash for sale, and controls mercury emissions. In a second system, TOXECON II™ injects the sorbent between the last two fields in an electrostatic precipitator, allowing at least 90 percent of the flyash to be sold and only 10 percent of the flyash to be commingled with activated carbon. The activated carbon can then be disposed of with the flyash.

The installation of a TOXECON™ system at the WE Energies Presque Isle Power Plant in Marquette, Michigan in 2006 as part of a DOE Clean Coal Program represented the first commercial operation of a mercury specific control system to the power industry. The Presque Isle system has been operating at 90% mercury control levels for over two years. Typical of many first installations of emission control technology, some operating problems were encountered during startup. The root cause of the problems was discovered, and new operating procedures were developed and implemented that can now be used in other commercial systems based upon this technology.

Commercial Market

Today, control technology vendors are actively installing mercury control systems across the United States to meet regulations in nineteen states for existing plants and permit requirements for new power plants. The air pollution control industry has reported booking new contracts for mercury specific control equipment, primarily activated carbon

injection, on coal-fired power plant boilers representing a vast range of boiler configurations, sizes, and coal-types. This has been a very competitive market with more than a half dozen companies having won contracts for over 150 ACI systems. These bookings are for controlling mercury on new and existing boilers ranging in size from 52 to 880 MW in capacity with the average size unit being 500 MW in size. The technology bookings are for all three of the predominant types of coal burned in U.S. electric power boilers including subbituminous, bituminous, and lignite coals. The diversity of coal burned by the units is broad including units burning high-sulfur bituminous, low-sulfur subbituminous, bituminous blended with biomass, western bituminous and subbituminous blends, bituminous blends, and lignite/subbituminous multi-fuel applications.

The performance of the commercial mercury control systems was highlighted in a study by U.S. Government Accountability Office that was conducted for the EPW committee. This October, 2009 study reported that sorbent-injection systems achieved substantial mercury reductions on all three main types of coal and on boiler configurations that exist at nearly three-fourths of U.S. coal-fired power plants. Specific findings included:

- Sorbent-injection systems are seen by the Department of Energy as a promising technology since they cost an average of \$3.6 million per plant, which is low compared to other types of emission-control equipment.
- The managers of 14 coal-fired power plants reported that they currently operate sorbent injection systems on 25 boilers to meet the mercury emissions reduction requirements of five states and several consent decrees and construction permits. Data from power plants show that these boilers have achieved, on average, reductions in mercury emissions of about 90 percent.
- Of note, all 25 boilers currently operating sorbent injection systems nationwide have met or surpassed their relevant regulatory mercury requirements, according to plant managers.

Mercury control is a good example of the fact that once regulations are put in place, the resulting market forces stimulate investment by the private sector. Recognizing the increase in demand for activated carbon driven by the State regulations, ADA made plans and investments into new and expanded activated carbon production facilities. We led the effort to build what will be the largest and most environmental friendly AC manufacturing plant in the US. This plant, which is shown in Figure 2, is located in Louisiana and is scheduled to startup this spring and will have the capacity to produce 150,000 million pounds of activated carbon annually. In addition, the Louisiana plant is already permitted for another line of equal size and we've initiated permitting on four additional AC production lines to produce the approximately 1 billion pounds per year that may be required to meet a strict Federal rule. This would require in capital investments of nearly \$2 Billion.

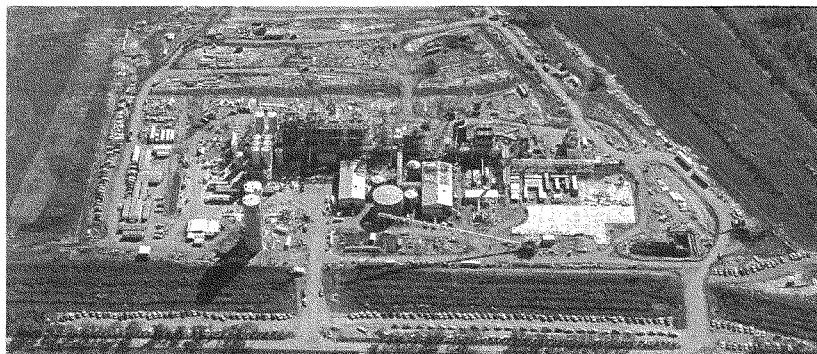


Figure 2. ADA Activated Carbon Manufacturing Plant Being Built in NW Louisiana.

Flexibility in the Regulation Reduces Costs and Enables Smooth Implementation

All power plants are not created equal as they are engineered for specific conditions and needs. Different coal types, boiler designs, and power plant configurations will provide a variety of technical challenges that will result in significant plant by plant variations in the costs to implement high levels of emissions reductions. This has also been the challenge for the application of emissions control technologies for other pollutants on coal-fired power plants that has spurred the development of a suite of control technology options for each pollutant.

Flexibility as a part of emission regulations is good for both technology suppliers and users so that emission reduction goals can be attained while reducing risks and lowering costs. The more stringent the regulation, the more important the issue of flexibility becomes. With potential regulations requiring 90% removal of mercury, flexibility can be invaluable in reducing costs and risks.

ADA supports flexibility in a regulation because it can be proven to reduce overall costs of controlling emissions including significant burdens for the most challenging applications. In addition, a well designed program will ultimately result in achieving greater reductions in mercury emissions without jeopardizing the reliability of electricity supply. Some options for providing flexibility include:

- To level out site by site differences in the costs to implement control strategies, market-based cap-and-trade programs or system-wide averaging have proven effective. While the emission control cap required by CAMR was much too low to overcome concerns over hotspots, a 90% requirement would minimize this concern.
- Phased approaches that incrementally require more emissions reductions over time reduce risk to both the power generator and the equipment supplier. A two-phased

approach might be one method of dealing with the timing discrepancy in a multi-pollutant regulation such as this three pollutant bill. For plants that burn bituminous coals, the SCRs that will be installed for control of NO_x and the scrubbers that will be installed for control of SO₂ will be a key part of their mercury control strategy. However, the 2015 deadline for reducing mercury emissions will occur a few years before the SCRs and scrubbers are installed. Therefore, it may be appropriate to have a lower mercury reduction threshold for plants that have agreed to install multi-pollutant equipment at a later time.

- Concepts such as “soft landings” and “safety valves” permit the installation of the technology and set the emissions limits based on the best performance achievable from the newly installed equipment. This greatly reduces costs and risks at plants that run into unexpected limitations on performance because of specific design or operating characteristics. The mercury regulation passed by the State of Illinois EPA for their sixty plus coal-fired power plants is a good example of an effective use of this concept. The rule was based upon data from DOE demonstrations and commercial ACI installations that indicated that 90% reduction could be achieved at many plants at a feed rate of 3 pounds of activated carbon per million cubic feet of flue gas treated (lb/MMacf). To provide a safety valve, the rule was set for 90% reduction by July 2009 with the caveat that if a plant injected a high-quality AC at 5 lb/MMacf and did not achieve 90% reduction, then it would be considered in compliance until 2015 when it would have to take additional measures to achieve the 90%. This type of approach achieves near-term reductions of mercury emissions, while allowing for plants on a case by case basis to continue to operate if the initial attempt to meet the emission standard is not completely successful.
- Flexibility in the form of a multipollutant approach can potentially create the greatest cost reductions. All mercury control technologies incorporate interactions with other air pollution control equipment often resulting in co-benefits. This includes oxidation of mercury across SCRs, capture of mercury in wet scrubbers, and increased fine particle capture and higher mercury removal when ACI is used with a fabric filter. Therefore, costs can be minimized under a multi-pollutant regulatory framework in which decisions about mercury can be integrated with strategies to address other criteria pollutants.

There are many examples of these types of flexibility that have been used in the more than a dozen state regulations that have been implemented for mercury control. However, many of these options are not available to EPA when forced to operate under a MACT regulatory environment. To fully take advantage of all of the options for flexibility in a mercury control regulation, it will be necessary for Congress to address this issue through legislation.

Emission Control Regulations Create Jobs

Mercury control regulations will impact growth of new jobs as have previous regulations of other pollutants. For a mercury specific control technology, such as activated carbon injection (ACI), a great deal of expansion of activated carbon production is currently being planned, but is contingent on a Federal mercury regulation.

These expansion plans will be implemented in a timely manner to meet the market created by a Federal mercury control rule. It is estimated that a 90% mercury control rule could require capital investments for new AC production plants creating \$2 Billion in construction jobs. In addition to the construction jobs to build the plants, there will be continuous operating jobs to run the new facilities, as well as mining jobs to supply the feedstock material needed to make AC.

In order to finance these expansions, it will be necessary to have certainty in the regulations. Building a large scale AC production facility is a three to five year process which must begin in anticipation of a regulation. However, construction cannot begin until the regulations are final. Debt financing is challenging to obtain when lenders are concerned that the regulation creating the market for the product from the new plant might disappear as was the case with CAMR.

In summary, the air pollution control industry continues to work with power plant operators to ensure that mercury control systems are integrated into the facility's design and specific coal requirements, and that any operational issues can be addressed. Significant advancements continue to be made in mercury control technology and commercial deployment is ongoing.

Questions for Michael Durham

Questions from:

Senator Benjamin L. Cardin

1. The technologies used to mitigate SO₂ and NO_x pollutants are readily available and highly effective. However, different controls offer different levels of clean air protections often with greater protections coming at greater costs. If we learn that the levels of control proposed in this legislation are inadequate, and that we need more reductions (e.g., to achieve the more stringent air quality standards), won't it be more expensive to achieve that higher level of control later, after less protective controls are in place, as compared to going for the higher level of control now?

The emissions controls that will be supplied to the power industry to meet the emissions limits in this bill will be equipment that is proven to provide the highest levels of reducing air pollutants and will include:

- Flue gas desulfurization (FGD) scrubbers capable of capturing up to 98% of the sulfur dioxide
- Selective catalytic reduction (SCR) catalysts for elimination of 90% of the nitrogen oxides, and
- Activated carbon injection (ACI) systems capable of capturing 90% of the mercury

A stricter regulation would not change the equipment that is added, as these are the best the industry has to offer, but would result in these same systems being installed at more plants.

Senator James M. Inhofe

1. Do test data show that 'activated carbon' systems control mercury emissions to the same level on all types of fuels, including low rank coals such as lignite in North Dakota or along the Gulf Coast?

Activated carbon injection (ACI) technology is capable of capturing mercury from all coals: bituminous, subbituminous, and lignite. However, each rank of coal has its own challenges. For bituminous coals, we have to deal with interference from the high sulfur. This is addressed by injecting alkali material to eliminate the interfering sulfur species. For subbituminous and lignite coals we have to address the fact that these coals are low in halogens like chlorine and bromine, so we have to add halogens to the coal or the activated carbon to achieve effective mercury capture. For lignite coals we have to address two other issues. One is related to the higher temperatures that some of these plants run at. For the highest levels of mercury control, some plants may require cooling of the flue gas to increase the effectiveness of ACI. The second issue relates to the fact that the gulf coast lignites have higher concentrations of mercury than other coals. That means it will take higher volumes of AC, and therefore higher costs, to reduce the mercury to the same emission levels as bituminous and subbituminous.

2. How much testing data do you have on 'activated carbon' systems that have actually been installed on power plants and that are being routinely used to control mercury? Please provide a summary of the results of existing test data on power plants including performance over time for different coal ranks.

Once the commercial equipment is installed at a power plant, the operation and performance of that equipment is only known by the power company and that data is proprietary. Therefore, the equipment vendors do not have access to data on these installations unless it is released by the individual plants.

The best sources of data on performance of commercial mercury control equipment will be the GAO report, which obtained data from the plants, and the current Information Collection Request (ICR) process being conducted by EPA as part of the MACT process in which data on emissions from hundreds of power plants are being collected.

3. Some reports indicate 'halogenated activated carbon' is achieving superior capture of mercury emissions. How much study has been done on the long term effects of the halogen compounds on plant facilities, plant workers, and the recycling of coal combustion by-products?

Bromine is a natural product found in the oceans and added to hot-tubs to clean the water. We add trace amounts in the activated carbon to enhance performance for western coals. The total halogen added is less than that naturally present in bituminous coals that have been burned for decades. As far as the availability of long term data related to mercury control, this will obviously be limited until there is a Federal regulation requiring installation mercury control on US power plants.

4. Would your company guarantee to pay all of your customers compliance costs if your system did not achieve at least a 90% reduction of mercury emissions from a coal fueled power plants, including plants that use sub-bituminous, bituminous, or lignite, or an appropriate blend of coal ranks? Do you know of any company in your business that does provide such a guarantee?

Mercury is the fourth pollutant that coal-fired power plants have been regulated to control. The first was fine particles as part of the original Clean Air Act, followed by SO₂ and NO_x as part of subsequent Clean Air Act Amendments. The contracts for emission control technologies for all pollutants such as ESPs, fabric filters, scrubbers, SCRs, and now ACI have evolved over the years but have similar features relative to guarantees:

- Because of the differences in power plant designs, coal characteristics, operating conditions, and emissions regulations, all guarantees for emission control equipment for all pollutants are site specific. The contracts specify the specific coal or range of coals, the location and design of the plant, and the range of

expected operating conditions such as temperature, flow rate, and gas constituents. The guarantee for the specific plant will then apply to all conditions that fit within the specified ranges.

- The guarantees are performance based and often include liquidated damages if the equipment does not perform as expected.
- The guarantees often have “make right” provisions that require the vendor to fix the equipment or add additional equipment if it does not meet the performance guarantee. The liability to satisfy this provision is usually capped at the value of the contract.
- No emission control equipment guarantees have ever included hold harmless clauses for payment of consequential damages. This will likely not change, as the power companies are not willing to pay for the additional costs associated with that type of guarantee.

What must be understood about guarantees is that it represents a shared risk situation between the supplier of the emission control equipment and the power producer who will rely of the performance of the equipment to meet a standard. The guarantee does not mitigate the risk as failure of the equipment to perform represents a “lose-lose” situation for the both parties. The supplier risks large payments for liquidated damages for lack of performance and the power producer faces loss of generating revenues and potential fines. Therefore, it is critical to both parties involved that the emission standards be established at levels that are achievable.

5. Does an annual average help compliance with your technology? Does it get easier or harder with a shorter time period?

For regulations on emissions, the definition of averaging time varies according to the toxicity of the emission and the concern over the potential impacts on health and the environment. For very toxic pollutants, short averaging times are commonly recommended.

However, for mercury being emitted from burning coal, the concentrations are extremely low (a few parts per billion) and the chemical form of the mercury being emitted is not considered toxic. The concern over mercury emissions is from the deposition of mercury that gets into the waterways and then converts to a toxic form, methylmercury. Therefore, the environmental problem created by mercury emissions is the cumulative amount of mercury put into the atmosphere that could end up in the waterways. For this concern a long-time averaging period is appropriate.

For example, an average-size power plant may emit 120 pounds of mercury per year without controls. With 90% control technology, it will emit 12 pounds per year. The environmental impact of those emissions will not be significantly different if those 12 pounds are emitted over a short period of time or evenly throughout the year.

The advantage of a longer-time averaging period, if it is appropriate, is that it allows time to respond to a malfunction, equipment problem, or an operating upset condition that may result in higher emission rates for a period of time. With time to resolve the problem causing the increased emissions, the plant can fix the problem, and then operate at a higher efficiency, or lower production rate, until the emissions reach an acceptable level on a cumulative basis. We believe that a rolling average of at least 30 days would be appropriate.

Senator CARPER. Thank you. That last point was especially welcome and timely. Thank you.

Secretary O'Mara, welcome. Please proceed.

STATEMENT OF COLLIN P. O'MARA, SECRETARY, NATURAL RESOURCES AND ENVIRONMENTAL CONTROL, STATE OF DELAWARE

Mr. O'MARA. My name is Collin O'Mara, and I serve as the Secretary of the Department of Natural Resources and Environmental Control under the leadership of Governor Jack Markell in the great State of Delaware. I would like to thank Senator Carper for the opportunity to share our thoughts on the proposed amendments to the Clean Air Act to establish a multi-pollutant regulatory program for the electric generating sector.

I would also like to introduce my Air Director, Ali Mirzakhali, who has been integral to the air emission efforts in reducing emissions in the State of Delaware.

Senator CARPER. Let the record show that I can barely see Ali sitting right behind Collin. I can barely see his lips moving while you speak.

Mr. O'MARA. I will take responsibility for butchering his last name again.

[Laughter.]

Mr. O'MARA. I would be remiss not to begin my comments without recognizing first Senator Carper's steadfast dedication to our environment in Delaware and his tireless efforts to ensure that all Americans have the right to clean, healthy air. I specifically want to recognize his leadership in the area of diesel emission reductions and the introduction and funding of the Diesel Emission Reduction Act which has enabled us in Delaware to implement a number of diesel retrofit activities, activities that would not have otherwise been possible without his leadership.

So, thank you, Senator, for—

Senator CARPER. You are very nice to say that, but I have been joined at the hip with this man over here, George Voinovich. I have been drafting on him, as we say in NASCAR, drafting on him on diesel emissions for a long time, and together we have done great work. And we applaud what Delaware is doing—

Mr. O'MARA. On behalf of Delaware, thank you, Senator Voinovich, as well.

Every year, millions of people across the country and the 800,000 residents of Delaware are exposed to unhealthful levels of air pollution, resulting in lost work days, hospitalization, respiratory and cardiac diseases, premature mortality, and billions of dollars of adverse impacts on our economy. Delaware is not immune to these challenges by any stretch, and these challenges are correlated to the air pollution that we face in the State. And unfortunately, in Delaware we face some of the highest rates of cancer and respiratory disease in the Nation.

To provide cleaner air to our citizens, Delaware has adopted many regulations ranging from rules for inspection and maintenance of automobiles, standards for consumer products, requirements applicable to many industrial sources, and we are advancing

energy efficiency, renewable energy activities as rapidly as possible.

As a result, we have seen our air quality improve over the years. And last year Delaware had no exceedances of the old 0.08 8-hour ozone standard, and we are working hard to figure out what is needed to meet the future ozone standard which will certainly be lower than the 0.075 parts per million.

One of the greatest regulatory successes that we have had is the adoption of multi-pollutant regulations for the coal and oil fired electrical and gas generating units. The outcome-driven regulations establish performance standards for NO_x, SO_x and mercury to be met by each unit. We found that these controls are necessary to meet the regulatory limits. But they are also technically feasible and highly cost effective.

The coal-fired units are all meeting the mercury emission reductions in excess of 80 percent and on track to meet additional reductions of 90 percent by 2013. The units that are remaining in operation are also meeting the first phase of the nitrous oxide and sulfur dioxide reductions and are on track for the final compliance phase which begins at the end of 2011.

For these and other efforts, Delaware is recognized as having one of the more robust air pollution control programs in the country. We have also worked with our regional partners in the Ozone Transport Commission and have adopted programs to reduce emissions generated within the Ozone Transport Region.

And most notable, and perhaps most effective of such programs, was the OTC NO_x Budget Program which targeted NO_x emissions from the EGU sector, which was later mirrored and adopted by the EPA in the NO_x SIP Call.

Unfortunately, despite this progress, Delaware's air quality still fails to meet attainment standards, mostly because of high levels of pollution imported from other States. As Senator Carper often says and said this morning, Delaware sits at the end of America's tailpipe. We are heavily impacted by the air emissions coming from the West. The most significant contributors of these are the emissions and air pollution from the hundreds of uncontrolled or poorly controlled electric generating units in upwind States.

In addition to air quality and associated health cost impacts from these sources, this inequity places consumers in Delaware who depend on power from cleaner EGUs in Delaware at an economic disadvantage compared to those in upwind States who have failed to implement such controls. And this argument is central to our pending 126 petition with EPA.

As Senator Carper has said, air pollutants do not recognize State boundaries. And it is with this backdrop that we are here today to lend our support to a bill that proposes a national solution to an elusive national challenge of improving air quality by addressing the emissions of multi-pollutants from the EGU sector.

Previous attempts to gain reductions from this sector prove that controls are feasible and highly cost effective. Unfortunately, previous efforts did not go far enough. Today, 80 percent of the SO₂ emissions nationwide come from uncontrolled coal-fired EGUs and only 25 percent of the EGUs in the Nation have controlled SCR to control NO_x.

Significant emission reductions are possible and achievable from this sector and without a significant lead time. And after the adoption of Maryland's Healthy Air Act, as Senator Cardin referenced earlier, nine scrubbers and eight SCRs were installed on the affected EGUs within 2 years.

The Clean Air Act Amendments of 2010 introduce a tough and meaningful national SO_x cap which we anticipate will result in installation of controls on many of the currently uncontrolled EGUs. SO_x emissions are a precursor to fine particle formation and reductions associated with this bill will have a significant public health benefit in Delaware and across the country.

The bill also proposes an aggressive 90 percent reduction in mercury and builds upon the best practices of Delaware, Maryland and other East Coast States. The bill preserves States' rights under section 110 and 126 of the Clean Air Act and it does not interfere with the New Source Review provisions.

The certainty that comes along with this legislation will aid States and industry for planning for the design, permitting, fabrication and installation of controls which is important to both regulators and industry alike. By focusing on outcomes, this bill is likely to spur great innovation because it will provide predictable targets for industry to meet and sufficient lead time for commercialization of even more cost effective technology, as my colleague just mentioned.

The bill provides EPA with the authority needed to implement phase one of the CAIR rule, and we would encourage the consideration of additional EPA authorities for adjusting the sulfur dioxide emission budgets and annual and/or seasonal NO_x budgets as necessary to protect public health, meet current and new standards, and address transport emissions as new science becomes available.

Finally, I would like to mention briefly the 53 percent nationwide reduction in NO_x. This is an important step forward. On this point, please let me share our experience with you in Delaware.

What we have learned through our collaboration with the OTC is that controlling NO_x emissions from EGUs may be the silver bullet for meeting ozone standards. We have learned that significant NO_x reductions are feasible, cost effective and necessary for us to reach attainment, and readily achievable through existing cost effective technology that is improving every day.

We believe that adopting a more aggressive approach or a more accelerated implementation time line for NO_x would help States like Delaware achieve attainment of the ozone standard even more quickly than would be otherwise possible.

In conclusion, we would like to thank Senator Carper for his leadership. We believe that the proposed legislation represents a very important step forward in reducing harmful emissions from EGUs across our Nation and will improve health outcomes in Delaware and across the country.

We look forward to working with the Committee as you continue to refine and strengthen this significant legislation. We thank you for the opportunity to be with you today, and we look forward to your questions.

[The prepared statement of Mr. O'Mara follows:]

Statement by

Collin P. O'Mara
Secretary of Natural Resources and Environmental Control
State of Delaware
Thursday, March 4, 2010

Submitted to

U.S. Senate Committee on Environment & Public Works
and its Subcommittee on Clean Air and Nuclear Safety

Legislative Hearing: S. 2995, The Clean Air Act Amendments of 2010

Good Morning. My name is Collin O'Mara and I serve as Secretary of the Department of Natural Resources and Environmental Control under the leadership of Governor Jack Markell in the state of Delaware. I would like to thank Chairwoman Boxer, Ranking Member Inhofe, Subcommittee Chairman Carper, Ranking Member Vitter, and all the members of the Environment and Public Works Committee and its Clean Air and Nuclear Safety subcommittee for the opportunity to share our thoughts on the proposed amendments to the Clean Air Act to establish a multi-pollutant regulatory program for the electric generating sector.

I would be remiss not to begin my comments by recognizing Senator Carper's steadfast dedication to our environment and his tireless efforts to ensure that all Americans have the right to clean, healthy air. I specifically want to recognize Senator Carper's efforts in the area of diesel emissions reduction and the introduction and funding of the Diesel Emissions Reduction Act which has enabled us to implement a number of diesel retrofit activities—activities that would not have otherwise been possible. Thank you, Senator Carper, for your leadership in Delaware and across the nation.

Every year millions of people in the U.S. are exposed to unhealthful levels of air pollution, resulting in lost work days, hospitalization, respiratory and cardiac diseases, premature mortality, and billions of dollars of adverse impacts on our economy. Delaware is not immune to these challenges correlated to air pollution and faces some of the highest rates of cancer and respiratory diseases in the nation.

In our effort to provide cleaner air to our citizens, Delaware has adopted many regulations ranging from rules for inspection and maintenance of automobiles, standards for consumer products, and requirements applicable to many industrial sources. As a result, we have seen our state's air quality improve over the years. Last year, Delaware had no exceedances of the

old 0.08 eight-hour Ozone standard and we are working hard to figure out what is needed to meet the future Ozone standard which will certainly be lower than 0.075 parts per million.

One of the greatest regulatory successes we have had is the adoption of multi-pollutant regulations for the coal and oil fired Electrical Generating Units. The outcome-driven regulation establishes performance standards for NO_x, SO₂ and mercury to be met by each unit. We found controls necessary to meet the regulatory limits were technically feasible and highly cost effective. The coal fired units are all meeting mercury emissions reductions in excess of 80% and are on track to meet the next phase which requires 90% control by 2013. The units remaining in operation are also meeting the first phase of the NO_x and SO₂ reduction and are on track for the final compliance phase which begins at the end of 2011.

For these and other efforts, Delaware is recognized as having one of the more robust air pollution control programs in the country. We have also worked with our regional partners in the Ozone Transport Commission and have adopted a number of programs to reduce emissions that are generated within the OTR. The most notable and perhaps most effective of such programs was the OTC NO_x Budget Program which targeted NO_x emissions from the EGU sector, and which was later mirrored and adopted by the EPA in the NO_x SIP Call.

Unfortunately, despite this progress, Delaware's air quality still fails to meet attainment standards mostly because of high levels of pollution imported from other states. As Senator Carper often says, "Delaware sits at the end of America's tailpipe." We are heavily impacted by air emissions coming from the West. The most significant of these contributors are emissions and air pollution from the hundreds of uncontrolled or poorly controlled electric generating units in upwind states. In addition to air quality and associated health impacts from these sources, this inequity places consumers who depend on power from cleaner EGUs at an economic disadvantage compared to those in upwind states who have failed to implement such controls. (This argument was central to our pending Section 126 petition from 2008.)

Air pollutants do not recognize state boundaries and it is with this backdrop that we are here today to lend our support to a bill that proposes a national solution to the elusive national challenge of improving air quality by addressing the emissions of multiple air pollutants from the electric generating sector. Previous attempts to gain reductions from this sector have proved that controls are feasible and highly cost effective; unfortunately, these efforts did not go far enough. Today, 80% of the SO₂ emissions nationwide come from uncontrolled coal fired EGUs and only 25% of the EGUs have installed SCR to control NO_x. Significant emissions reductions are possible and achievable from this sector without a need for significant lead times. After the adoption of Maryland's Healthy Air Act, nine scrubbers and eight SCRs were installed on the affected EGUs in two years time.

The Clean Air Act Amendments of 2010 introduces a tough and meaningful national SO₂ cap which we anticipate will result in installation of controls on many of the currently uncontrolled EGUs. SO₂ emissions are a precursor to fine particles formation and reductions associated with this bill will have significant public health benefits. The bill also proposes an aggressive 90% reduction of mercury and builds upon the best practices of Delaware and other states.

The bill preserves State's rights under Sections 110 and 126 and it does not interfere with the New Source Review provisions of the Clean Air Act. The certainty that comes along with legislation will aid the states and industry with planning for design, permitting, fabrication and installation of controls. By focusing on outcomes, the bill is also likely to spur innovation because it will provide predictable targets for industry to meet and sufficient lead time for commercialization of many ideas.

The bill provides EPA the authority needed to implement the phase I of CAIR and we would encourage the consideration of additional EPA authorities for adjusting the annual sulfur dioxide emissions budgets and annual and/or seasonal NO_x emission budgets as necessary to protect public health, meet current and new standards, and address transport emissions.

The bill also proposes a 53% nationwide reduction in NO_x by 2015. On this point, please allow me to share with you briefly our experiences in Delaware. What we have learned through collaboration with the OTC is that controlling NO_x emissions from EGUs may be the silver bullet for meeting the ozone standard. We have learned that significant NO_x reductions are feasible, cost effective, and necessary for us to reach attainment and are readily achievable through existing, cost-effective technology. We believe that adopting a more aggressive approach and/or a more accelerated implementation timeline for NO_x reductions would help states like Delaware achieve attainment of the ozone standard more rapidly than would be otherwise possible.

In conclusion, Delaware believes that the proposed legislation represents an important step forward in reducing harmful emissions from EGU's across our nation and improving public health outcomes. We look forward to working with the Committee as you continue to refine and strengthen this significant legislation. Thank you again for opportunity to speak today about this important issue and I am available to answer any questions.

Senator CARPER. Thank you for your very thoughtful testimony and for your very kind words as well. We appreciate your leadership and your energy, the energy that you have brought to Delaware and clean energy, clean energy to our environment into our economy.

Mr. McManus, again, welcome. Sometimes, when I find out folks at the witness table are from like Ohio or Ohio State, I will start off their introduction by saying OH to see how they respond.

Mr. MCMANUS. IO.

Senator CARPER. OK, he is an Ohio State guy. For those of you who have never been to an Ohio State football game, one side of the stadium the fans call out OH and the other side IO and they do it forever, especially when we are playing Michigan. And it is quite an exciting moment.

But we are delighted that you are here, and in the spirit of trying to figure out how to work through this together and come up with a way that will enable our industries to make money and for us to clean up our environment, and provide some certainty not just for AP but also for the company that Mr. Durham represents and for the folks that are counting on us to help clean up our air as we go forth.

So, thanks, and we welcome you.

**STATEMENT OF JOHN M. MCMANUS, VICE PRESENT,
ENVIRONMENTAL SERVICES, AMERICAN ELECTRIC POWER**

Mr. MCMANUS. Thanks, Chairman Carper, and the Committee. I appreciate the opportunity to participate in today's hearing.

AEP has achieved very substantial emission reductions over the last two decades. Our efforts began in the 1990s under the Acid Rain Program and continued with the NO_x SIP Call and the CAIR Program in the past decade. In the last 10 years our annual SO₂ emissions have been reduced 600,000 tons, and our annual NO_x emissions have declined 365,000 tons. We also know that we have achieved significant mercury emission reductions as a result of our SO₂ and NO_x emission controls.

As the first phase of CAIR has taken effect in 2009 and 2010 amid some of the most difficult times our country has faced, our customers have shouldered the cost increases associated with these significant investments. We expect this transformation of our coal fleet to continue in the coming decade, even without new legislation.

We know that there will be new requirements for further emission reductions in the future. We heard from Administrator McCarthy this morning about what EPA is working on. Although committed to working with EPA on the development of future control requirements, we have concerns about the timing of compliance associated with multiple and overlapping programs, as well as the stringency and structure of the underlying regulatory requirements.

Clean Air Act Amendments that achieve environmental objectives with reasonable schedules and compliance flexibility could be extremely helpful. We have concerns about the Clean Air Act Amendments of 2010 as currently proposed. While the bill would retain the flexibility of regional emission programs for SO₂ and

NO_x, other provisions in the proposal are troublesome and would unnecessarily increase the cost of compliance.

AEP applauds the structure of the SO₂ and NO_x programs in the bill, with the reliance on an allowance based system. However, the schedule for implementing the new program's more stringent emission caps may be too fast. Under the proposal, the first tighter caps apply in 2012 with EPA rules to establish allocation due at the end of 2011. This allows only 1 year for implementation.

Increasing the stringency of the caps in 2012 may create major logistical challenges for the electric power sector. Companies will not have sufficient time to schedule outages and install emission controls that may be necessary for meeting new reduction requirements. The bill should provide a longer planning horizon before tightening the SO₂ and NO_x emission caps.

The bill would establish a much more aggressive allowance auction program than currently exists under the Acid Rain auction. This program to auction both SO₂ and NO_x allowances will unnecessarily add to the costs of compliance with no incremental environmental benefit and we believe should be eliminated from the program.

The bill prohibits EPA from distributing NO_x allowances to affected units based on heat input fuel adjustment factors under the annual NO_x cap-and-trade program. The elimination of fuel adjustment factors would penalize coal-fired generation and provide a windfall of NO_x allowances to gas- and oil-fired generation. The bill should direct EPA to use fuel adjustment factors in allocating NO_x allowances as provided in the current CAIR rule.

The bill requires EPA to promulgate, by January 2012, source-specific standards for reducing mercury from coal-fired units with an objective of achieving at least a 90 percent reduction overall in emissions from the entire source category. AEP agrees with the bill's focus on reducing mercury emissions from coal-fired power plants. However, we have significant concerns about the achievability of a 90 percent reduction level for the source category as a whole.

We are also concerned about the January 2015 deadline to achieve the mercury performance standard. This deadline provides only 3 years to achieve compliance once EPA promulgates the new standards. The bill should provide affected utilities with more time to develop and implement a compliance strategy for meeting the mercury control requirements.

As the bill is currently written EPA is not relieved from the plan to set standards for other non-mercury hazardous air pollutants. Regulation of these non-mercury HAPs is a significant concern.

The focus of only mercury in the bill is consistent with the results of the study that EPA conducted under section 112(n)(1)(A) of the Clean Air Act which concluded that there was not sufficient public health risks for non-mercury hazardous air pollutants emitted from coal-fired power plants. Given the results of that study, we believe the bill should expressly limit EPA's ability to regulate non-mercury HAPs emissions from coal-fired power plants.

In summary, AEP recognizes that there are many environmental drivers for additional emission reductions from our power plants, and we are already planning for many of these reductions. How-

ever, it is critical that any comprehensive program like the one envisioned in the Clean Air Act Amendments of 2010 be structured in a way to allow for cost effective implementation of reductions on a reasonable schedule so as to minimize the impacts on our customers and on the reliability of the electricity grid.

I would like to thank the Committee would the opportunity to participate today. I welcome your questions.

[The prepared statement of Mr. McManus follows:]

TESTIMONY OF JOHN M. MCMANUS

FOR AMERICAN ELECTRIC POWER

BEFORE THE SENATE ENVIRONMENT AND PUBLIC WORKS COMMITTEE AND
SUBCOMMITTEE ON CLEAN AIR AND NUCLEAR SAFETY JOINT HEARING

"S. 2995, THE CLEAN AIR ACT AMENDMENTS OF 2010"

March 3, 2010

Good morning. My name is John McManus. I am the Vice President of Environmental Services for American Electric Power ("AEP"). I would like to thank the Committee and Subcommittee for the opportunity to testify on behalf of AEP on "The Clean Air Act Amendments of 2010."

American Electric Power is one of the nation's largest electricity generators -- with nearly 38,000 megawatts (MW) of generating capacity -- and serves more than five million retail consumers in 11 states in the Midwest and south central regions of our nation. AEP's generating fleet employs diverse energy sources -- including coal, nuclear, hydroelectric, natural gas, oil, and wind power. Most importantly for today's hearing, though, approximately two-thirds of our generating capacity utilizes coal to generate electricity.

AEP's Current Efforts to Achieve Substantial Emissions Reductions

AEP has achieved very substantial SO₂ and NO_x reductions over the last two decades. Our efforts began with an ambitious effort to cut SO₂ and NO_x emissions in the 1990's under the Acid Rain program. The past decade has seen a continuation of this program to transform our fleet of coal-fired generating units. This transformation included the installation of state-of-the-art control technologies at many of our generating stations in order to meet the steep NO_x reduction requirements of the NO_x SIP Call in the early part of the decade. It has continued with a third wave of emissions controls being installed to achieve additional NO_x and SO₂ reductions required under the Clean Air Interstate Rule (CAIR). To date, we have invested over \$5 billion in emissions control equipment on our coal units to reduce SO₂ and NO_x emissions and comply with the NO_x SIP Call and CAIR programs.

As a result of these efforts, our SO₂ and NO_x emissions are at their lowest level in decades. In the last 10 years, our annual SO₂ emissions have declined 600,000 tons (57%) and our annual NO_x emissions have declined 365,000 tons (75%). We also know

that we have achieved significant mercury emissions reductions as a result of our SO₂ and NO_x emissions controls, even though the Clean Air Mercury Rule has been vacated. As the first phase of CAIR has taken effect in 2009 and 2010, amid some of the most difficult economic times our country has faced, our customers have shouldered the cost increases associated with these significant investments. The recovery in the Midwest and south central regions has not yet begun, and the prospects for recovery would be impaired by legislation that does not carefully balance the twin goals of environmental and economic progress.

We expect this transformation of our coal fleet to continue in the coming decade, even without new legislation. We currently have requirements to reduce SO₂ and NO_x emissions further at units that are regulated under the Clean Air Visibility Rule. We are also moving forward with emissions reduction projects to meet our obligations under the consent decree that AEP entered into with the Government related to the New Source Review Program. While considerable uncertainty exists over the timing and form of future regulations, we know that EPA is actively pursuing additional programs to reduce emissions, including a revised CAIR program, a new rule to address mercury and other hazardous air pollutants, and the establishment more stringent national ambient air quality standards. Although committed to working with EPA in the development of future control requirements, we have concerns about the timing of compliance associated with multiple and overlapping programs, as well as the stringency and structure of the underlying regulatory requirements. Some of those concerns are:

- The cumulative costs of multiple requirements and their impacts on our customers
- Immediate deadlines that do not take into account the need for economic recovery in our service territories
- The risk of stranded investments if near-term installations do not achieve the reductions required by future standards
- Lack of coordination between programs
- Impacts to grid reliability due to wide-scale unit outages to install emission controls and broad unit retirements within an aggressive compliance time frame
- The significant investments that may be required by non-air environmental programs

With respect to this last point, it is important to note that these Clean Air programs are not the only new environmental regulatory obligations we may face. EPA is currently developing a proposal related to the disposal of coal combustion byproducts that could

establish new requirements on how these materials are handled and significantly increase the cost of disposal. EPA is also revising its rule related to cooling water intakes and has announced its intent to update the steam-electric effluent guidelines. Both programs could result in significant new costs for existing power plants. Taken as a whole, this cost exposure is raising concern about the economic viability of a large number of coal-fired units, as well as potential impacts to grid reliability. And this is without consideration of the impact of legislation or regulation to limit carbon emissions.

Taking all of this into consideration, the transformation that we see in the coming decade could be very different from the last. This past decade saw the installation of emissions controls on many units on the AEP fleet as well as across the country. Those installations preserved the value of capital already invested, created new jobs, and produced significant environmental benefits. This coming decade may see more decisions to retire some units in addition to adding controls on other units. In fact, some companies have already made announcements about plans to retire older, smaller coal-fired units in the face of ever-increasing environmental obligations. The impacts of these retirements go far beyond the closure of the individual plant – they often represent the best-paying jobs in relatively rural regions, and there is little prospect for the replacement of those jobs. They also can have significant impacts on the reliability of the electric grid. The key to our ability to effectively manage this program will be the timing and achievability of the compliance obligations and the flexibility of the control programs. Clean Air Act amendments that achieve environmental objectives with reasonable schedules and compliance flexibility could be extremely helpful to protecting the environment without unduly hurting American workers.

The Clean Air Act Amendments of 2010

Unfortunately, the Clean Air Act Amendments of 2010 as currently proposed do not achieve this result. While the bill would retain the flexibility of regional emissions programs for SO₂ and NO_x, other provisions in the proposal are unrealistic and inflexible, and would increase the cost of compliance unnecessarily. AEP is particularly concerned about the following provisions:

Timing of SO₂ and NO_x requirements – AEP applauds the structure of the SO₂ and NO_x programs in the bill, with the reliance on an allowance-based program that is implemented on a national basis for SO₂ and on a broad, two zone regional basis for NO_x. However, the schedule for implementing the new program's more stringent emission caps is too fast. Under the proposal, the first SO₂ cap applies in 2012 with EPA rules to establish allocations due at the end of 2011. This allows for only one year for implementation. While the use of banked allowances will help with the transition to

the new cap, it is unreasonable to assume that no additional control equipment will have to be installed to meet these more stringent requirements.

One year is not nearly enough time for this. Increasing the stringency of the caps in 2012 creates major logistical challenges for the electric power sector. Companies will not have sufficient time to schedule outages and install emissions controls that are necessary for meeting new reduction requirements. The bill should provide a longer planning horizon before tightening the SO₂ and NO_x emissions caps in 2012. The first caps in 2012 are set at 3.5 million tons for SO₂ and 1.89 million tons for NO_x. To ensure companies have sufficient time to achieve these reduction levels, the bill should delay until 2015 the imposition of the first SO₂ and NO_x emissions caps.

Furthermore, this short time frame for implementation is inconsistent with past multi-pollutant reduction programs. Congress, for example, provided almost a decade to implement in two phases the SO₂ and NO_x reductions mandated under the Acid Rain program. Similarly, EPA established a two-phase program for achieving the reductions obligations under the CAIR program. The Phase I deadlines for CAIR allowed almost five years from promulgation of the final rule until the first compliance year for SO₂ and almost four years for NO_x. The Phase II deadlines allowed another five to six years before the more stringent Phase II reduction requirements went into effect for SO₂ and NO_x respectively.

Stringency of SO₂ and NO_x requirements – The bill significantly tightens the CAIR emissions caps for both SO₂ and NO_x. The tightening of the annual SO₂ emissions cap is accomplished by lowering the Phase II Acid Rain emissions cap from 8.95 million tons of SO₂ to 3.5 million tons in 2012-2014, 2.0 million tons in 2015-2018, and 1.5 million tons in 2020 and each year thereafter. With respect to NO_x, the bill establishes two separate NO_x emissions caps, with one cap applying to 32 states and the District of Columbia in the eastern half of the United States and the other applying to the 16 remaining western states. Although the eastern cap is only slightly more stringent than CAIR, the western cap imposes significant additional NO_x reductions on the electric power sector.

In addition to being an extremely aggressive emissions control program that will impose substantial increased compliance costs on the electric power sector, AEP has concerns with the need for the emissions cap levels proposed for 2015 and beyond under the bill. Specifically, we are aware of no EPA air quality modeling that demonstrates that these reduction levels are necessary to achieve the national ambient air quality standards or other environmental goals established under the Clean Air Act. Justification must be provided before requiring additional reductions below 3.5 million tons for SO₂ and 1.89 million tons for NO_x.

Another related concern is that the bill authorizes EPA to further tighten the SO₂ and NO_x emissions caps for calendar year 2021 and beyond. AEP believes that this conferral of authority is very broad and allows EPA to tighten the caps if it believes that additional reductions are necessary “to protect public health or the environment” or “to assist with the attainment or maintenance” of any national ambient air quality standard. The authority to tighten the caps should be eliminated from the bill. If further reductions are necessary from the electric power sector, the Clean Air Act contains multiple mechanisms for requiring these additional reductions within a state on a source-specific basis or across multi-state regions.

Use of more aggressive auctions than currently exist – The bill would establish a much more aggressive allowance auction program than currently exists under the Acid Rain SO₂ allowance auction. Although the language in the bill is not clear, one plausible reading of the auction provision is that, starting in 2018 for SO₂ and in 2014 for NO_x, the number of allowances auctioned increases by 10 percent each year until 100 percent of the SO₂ and NO_x allowances are auctioned in 2027 and 2024 respectively.

This phase-in of SO₂ and NO_x auctions will unnecessarily add to the cost of compliance with no incremental environmental benefit. It should be noted that one of the main reasons for inclusion of an auction in the original Acid Rain program was due to the uncertainty at the time over how an allowance-based compliance program would work and concern about the availability of allowances in such a new market. Congress included a nominal auction program to help “kick start” an allowance market. That need has long since passed as evidenced by the robust market for both SO₂ and NO_x allowances that has existed for years. At this point in time, the only result of a more aggressive auction program will be to increase compliance costs. Given that those costs, which are eventually borne by electricity customers, will be significant just for the installation of controls, there is no justification for raising them artificially with an auction.

In light of these considerations, AEP believes that the SO₂ and NO_x auctions should be eliminated from the program.

Method for Distributing NO_x Allowances – The bill prohibits EPA from distributing free NO_x allowances to affected units “based on baseline heat input fuel adjustment factors” under the annual NO_x cap-and-trade program. The elimination of fuel adjustment factors would penalize coal-fired generation and provide a windfall of NO_x allowances to gas- and oil-fired generation. The bill should direct EPA to use fuel adjustment factors in allocating NO_x allowances, as provided in the current CAIR rule. In the CAIR rulemaking, EPA selected the fuel factor adjustment approach as the most equitable and appropriate manner to distribute NO_x allowances to affected electric

generating units under a cap-and-trade program.¹ It is worth noting that, while the fuel factors issue was one of a number of issues identified by the D.C. Circuit Court of Appeals in its remand of CAIR to EPA, the Court did not construe the statute to legally bar the use of fuel factors in allocating allowances. Rather, the Court only ruled that EPA had not provided in the CAIR rulemaking sufficient justification for its decision to use the factors.

Stringency of mercury control requirements – The bill requires EPA to promulgate by January 1, 2012 source-specific performance standards based on “maximum achievable control technology” (MACT) for reducing mercury from coal-fired electric generating units. The bill requires the MACT performance standards to achieve overall at least a 90 percent reduction in mercury emissions from entire source category. AEP agrees with the bill’s focus on reducing only mercury emissions from coal-fired power plants. However, we have significant concerns about the stringency of the mercury reduction levels that are mandated under the bill.

A 90% reduction level for mercury is too stringent and unachievable in practice for the source category as a whole. As noted above, the installation of emissions control technology on a number of our coal-fired units has resulted in a mercury reduction co-benefit. AEP has measured these reductions, and while the combination of SO₂ and NO_x controls can achieve large reductions in mercury, we have not uniformly achieved 90% reductions. These controls are most effective, and the co-benefits are most significant, on units that burn bituminous coals. However, the chemistry is different at units that burn lower sulfur western coals. AEP has also installed activated carbon injection technology on two of our largest units. These units burn primarily western subbituminous coal. While we have seen significant mercury reductions, we do not have sufficient data yet to determine if a 90% reduction is achievable over an extended operating period. We are very concerned that the proposed 90% reduction requirement is too aggressive based on our understanding of the state of current technology.

Timing of mercury requirements – Affected coal-fired electric generating units must achieve compliance with the MACT performance standards for mercury by no later than January 1, 2015. This deadline provides only 3 years to achieve compliance once EPA promulgates the new mercury MACT standards. AEP believes a 3-year compliance window is too short and poses significant reliability concerns. First, AEP and other utilities will not have sufficient time to schedule outages and install emissions controls

¹ Although an absolute prohibition is not imposed under the seasonal NO_x program, the bill expressly authorizes EPA to eliminate the allocation of NO_x allowances based the fuel adjustment factors currently used by EPA under CAIR. As noted above for the annual NO_x program, the elimination of fuel adjustment factors would penalize coal-fired generation and provide a windfall of NO_x allowances to gas- and oil-fired generation.

that are necessary for meeting new MACT standards. The bill should provide affected electric utilities with a longer planning horizon to develop and implement a compliance strategy for meeting the mercury control requirements, in coordination with the upcoming air regulatory requirements for other air pollutants. There is no question that additional, costly control technology will be needed on many units. This may lead to decisions to shut down units instead of incurring the cost of controls. Looking at this for the country's coal fleet, the combination of taking units out of service to install controls and retiring a significant number of units instead of installing controls presents a potential reliability concern for some regions of the country.

Lack of specific protection against regulation of non-mercury hazardous air pollutants – As the bill is currently written, EPA is not relieved from its current statutory obligation to set MACT standards for other non-mercury hazardous air pollutants (HAPs), including acid gases (such as hydrogen chloride and hydrogen fluoride), non-mercury metallic particles (such as arsenic, beryllium, cadmium), and organic HAPs (such as dioxins and furans). This means that EPA must also adopt MACT standards for these non-mercury HAPs in addition to its obligation to adopt mercury MACT standards. The MACT standards for non-mercury HAPs also would apply on a unit-specific basis and could require the installation of SO₂ scrubbers, baghouses and/or other enhanced particulate controls.

Regulation of non-mercury HAPs is a significant concern. As noted above, AEP agrees with not including other hazardous air pollutants in the bill. This is consistent with the results of the study that EPA conducted under section 112(n)(1)(A) of the Clean Air Act. Notably the EPA study concluded that there was not sufficient public health risk for non-mercury hazardous air pollutants emitted from coal-fired power plants. However, there are no provisions in the bill to prevent EPA from regulating other HAPs. This leaves a huge uncertainty over potential future exposure to what could be very significant compliance costs. For these reasons, the bill should expressly limit EPA's ability to regulate non-mercury HAPs emissions from coal-fired power plants.

No "safe harbor" protection against additional regulation of SO₂ and NO_x under other provisions of the Clean Air Act – The bill provides no "safe harbor" from future federal and state control requirements for SO₂ and NO_x emissions from electric generating units. EPA and states, therefore, could require redundant, overlapping, and inconsistent SO₂ and NO_x reductions under existing Clean Air Act authorities. Imposing such additional control requirements negates the flexibility and regulatory certainty that a multi-pollutant control program is intended to provide. By the time the caps are fully implemented, it is reasonable to assume that almost all existing coal-fired generating units will be either retrofitted with control technology or retired. The contribution of this emission source sector to air quality issues like ozone, PM_{2.5}, visibility, etc. will have

been adequately addressed. The bill should provide some certainty that no further requirements will apply for these pollutants.

Conclusion

In summary, American Electric Power recognizes that there are many environmental drivers for additional emissions reductions from our coal-fired power plants. And AEP is already planning for many of those reductions. However, it is critical that any comprehensive program like the one envisioned in the Clean Air Act Amendments of 2010 be structured in a way to allow for cost-effective implementation on a reasonable schedule so as to minimize the impacts on our customers and on the reliability of the electricity grid. It is also critical that the emissions reduction levels of the program be set at levels that are technically feasible to achieve and in fact necessary to fulfill the air quality goals and requirements of the Act. Finally, it is critical that such a program provide some certainty over future compliance obligations as AEP and the rest of the industry continues the transformation of the electric generating fleet in this country. As it is currently written, the bill does not achieve these objectives.

I would like to thank the Committee and Subcommittee for the opportunity to present the views of AEP on this important issue.

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Follow-Up Questions for Written Submission**

Questions for John M. McManus, American Electric Power

Questions from:

Senator Benjamin L. Cardin

1. There are currently a large number of banked allowances for both SO₂ and NO_x programs. Given the large number of banked allowances, when would we see reductions in SO₂ and NO_x emissions under the cap levels outlined in S. 2995?

The timing, pace, and extent of annual SO₂ and NO_x emissions reductions resulting from S. 2995 is pollutant specific, dependent on numerous economic factors, and nearly impossible to predict with certainty. However, it is likely that SO₂ and NO_x reductions would occur fairly soon as companies implement strategies to comply with more stringent emission caps. These emission reductions will occur as SO₂ and NO_x allowance prices make higher emitting units less economic to run, while concurrently providing a financial incentive to install emission control systems.

With 2010 being the start of the 2:1 allowance surrender ratio for SO₂ emissions under the existing Clean Air Interstate Rule (CAIR), it is expected that the SO₂ allowance bank will quickly begin to decline during 2010 and in succeeding years as the cap becomes more stringent. Actual SO₂ emissions are expected to steadily decline over the same period.

With respect to NO_x emissions, only a small number of banked allowances is actually available. The existing annual NO_x program, the "Zone 1" program as modified by S. 2995, has been in effect for one compliance year, 2009, resulting in relatively small allowance bank. As such, actual NO_x emissions in the coming years are likely to be very close, if not below, cap levels. Additionally, the "Zone 2" NO_x program will have a zero bank of allowances to rely upon resulting in Zone 2 sources as a whole having to be at or below the NO_x cap level from the beginning of the program.

Senator James M. Inhofe

1. What problem will AEP have meeting the deadlines in S.2995?

S. 2995 will pose a number of challenges to AEP. With respect to mercury, a requirement for 90% mercury removal will be very challenging due to varying coal characteristics and associated mercury emission control technologies, as well as uncertainty regarding the short- and long-term performance of such technologies across a range of unit types and operating scenarios. There is no guarantee that all coal units can achieve this level of removal. In addition, meeting this requirement will require widespread testing and verification of the current removal equipment, along with efforts to design, permit and install these controls across the coal generation fleet. All of this will be difficult to achieve within this short time period. Furthermore, by delegating to EPA the authority to establish rules defining how the 90% reduction is to be measured, achieved and implemented, uncertainty in meeting the standard will prevail until a final rulemaking is completed. Thus, AEP faces the very real prospect of having to shut down a number of generating facilities by 2015 due to the stringency of the requirement as well as other factors.

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Plant retirements create an additional problem as new generation sources will be needed to replace the capacity of facilities retired because of the mercury standard. Any new generating facilities will take at least four years from project conception to completion and therefore may not be ready to operate as coal units are retired. This timeline could be impacted if large scale retirement across the electric industry occur over the same time period as controls are installed on units that will continue to operate, which would compromise the ability of companies to find skilled labor and materials, drive up project costs, and potentially lengthen the schedule for completing construction. A further complication may occur if retired units lead to the need to construct new transmission capacity to support reliability needs, given the long lead time that is needed for transmission projects.

AEP also will have challenges in meeting the "Zone 2" NO_x cap in S. 2995, which would require a roughly 25% reduction in emissions (from 2008 levels) in less than two years for the zone as a whole. To begin with, there will not be a bank of allowances available in this zone in the first year of the program. Installation of NO_x controls within this two year period will be a challenge, especially on a large scale. The challenge will be particularly acute for units that are equipped with SCR technology to meet compliance, which has a longer lead time for design, engineering, material procurement and construction. A longer implementation timeframe would allow for the installation of controls at a lower cost and with reduced rate impacts.

2. Does this legislation provide you with legal and regulatory certainty from future federal and state control requirements for SO₂ and NO_x emissions from electric generating units? Can you explain why?

As introduced, S. 2995 does not provide legal or regulatory certainty that compliance with the requirements of the legislation will avoid the imposition of future, more stringent SO₂ and NO_x emissions control requirements on electric utility units. The Administrator herself is authorized to impose more stringent requirements through the trading program if certain conditions are met. In addition, nothing in the Act exempts or excludes an affected electric utility unit from any other applicable requirement under the Clean Air Act. As occurred after the enactment of the 1990 Amendments, EPA will remain free to seek additional emission reductions from large stationary sources far removed from urban non-attainment areas in an effort to attain or maintain increasingly stringent ambient air quality standards. States may file petitions under Section 126, as North Carolina did, to seek additional reductions from specific units, regardless of whether those reductions actually promote attainment in the targeted areas, and regardless of the State's willingness to impose requirements on motor vehicles or other area sources within heavily populated urban areas that have a more direct impact on ambient air quality.

3. What would you recommend to be the most cost effective way to achieve the reductions?

The most cost effective way to achieve SO₂, NO_x, and mercury emission reductions is through market-based systems (i.e. emission trading, banking). For emissions with large areas of dispersal, emission trading is essential for providing economic flexibility in compliance by allowing reductions to occur at the sources with the lowest cost of compliance. The standards for these market-based mechanisms should be based on currently available emission mitigation

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options, and should include an appropriate timeframe, which allows for the construction of economic controls or replacement generation. An implementation timeline that is too short will lead to uneconomic emission reductions and higher consumer costs. Finally, to ensure cost-effectiveness, the plan for emission reductions needs to be comprehensive for the covered sources. Unless the appropriate protections are provided legislatively, duplicative or more stringent emission regulations in the future could lead to near-term uneconomic decisions and stranded investments in emission control technology.

4. Will the problems require shutting down some coal fired power plants?

The current deadlines in the bill would certainly prompt some plant retirements, as insufficient time is provided for the construction of new controls to meet the proposed targets at all existing plants. In addition, to the extent that the proposed SO₂, NO_x, and mercury limits require the installation of additional control technologies that are not cost-effective on units that presently have higher operating costs, then it is likely that a significant number of coal units will be taken out of service instead of retrofitted with controls. Finally, a number of units may have site-specific constraints that will not accommodate new controls, and those units would also be retired.

5. Will shut downs affect reliability of your system? Do you think reliability would be a problem for other utilities?

A key factor in determining whether retirements of existing coal units will lead to reliability problems is the schedule for achieving compliance with the new requirements. As I noted in my testimony, AEP is concerned about the deadlines for both the SO₂ and NO_x programs, as well as the mercury program. A short compliance period can result in a number of impacts. Companies may not have sufficient lead time to design, permit, engineer, procure materials and construct new emissions control systems. Additionally, a large number of units may need to concurrently be taken off-line to tie in new control systems. For units for which a retirement decision is made, similar or longer lead times will be needed to bring new replacement capacity into operation or to address reliability problems associated with that retirement. While the SO₂ and NO_x program provides some flexibility with the ability to use banked allowances, the new mercury program has little to no flexibility. AEP has not analyzed at this time whether a reliability problem will occur on its system. AEP believes such an analysis is needed for broader electric reliability regions, particularly those that have a heavy reliance on coal-fired generation.

6. What type of unit will replace the shutdown coal unit? Some say combined-cycle gas units. Do you know if there will be enough gas or pipelines should significant numbers of gas units have to be built?

The type of units that would replace the capacity of a retired coal unit cannot be precisely determined as the selection of new generation technology is strongly influenced by a number of economic, technology, and regulatory factors that are specific to each proposed project location. It is reasonable to expect that a significant amount of any replacement capacity will be natural gas units (simple cycle and combined cycle units).

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A number of factors can affect the selection of natural gas over coal. It is extremely difficult and time consuming to obtain the needed environmental permits for new coal-fired power plants. Even if permits are issued by environmental agencies, they are invariably challenged by intervenors, impacting the ability to bring the replacement unit into service when needed. In addition, current energy markets and relative costs of new coal vs. gas generation combined with uncertainty on new environmental regulatory requirements tend to favor natural gas replacements. Finally, the time needed to build and construct a coal plant is typically much longer than a gas unit and the time frame that many coal retirements would occur under the bill (over the next 3-5 years) would make replacement with coal infeasible. Similarly, other base load generating options such as nuclear could not be built in this time frame. It is important to note that these decisions tend to be made in the context of a broad, integrated resource plan that also takes into consideration projected need for energy by customers, opportunities for demand side energy efficiency programs and availability of renewable energy resources.

AEP has not conducted an analysis of the adequacy of natural gas supply and pipelines to meet the potential increase in gas-fired electric generation under S. 2995, though such an analysis would be valuable in understanding these potential impacts.

Senator David Vitter

1. Given that affected units firing commercial quality natural gas have virtually no SO₂ emissions, do you believe new legislation should consider a "Clean Unit Exemption" that exempts affected units firing natural gas from the SO₂ control program?

AEP agrees that affected units that exclusively use natural gas have very low SO₂ emissions. Additionally, under the current Acid Rain and CAIR SO₂ allowance system, some regulated units are capable of burning natural gas and have received a small allowance allocation. As such, there is no reason to exclude them from the SO₂ control program as the requirements will not impact them. Excluding such units will complicate the SO₂ allocation system, particularly if units that currently utilize coal convert to natural gas in the future. Such converted units would have to be accounted for in the allocation formulas, which could in turn impact allocations for other units. This complexity can be avoided by keeping the units in the program.

2. Given that affected units that employ the most advanced NO_x controls commercially available (i.e., Selective Catalytic Reduction (SCR) Technology) have very low NO_x emissions, do you believe new legislation should consider a "Clean Unit Exemption" that exempts affected units equipped with SCR NO_x control technology from the NO_x control program?

While units that use SCR technology typically have very low NO_x emissions rates, they do still emit some NO_x emissions. Further, over the course of the program, more and more coal fired units will be equipped with SCR technology as well. In order to maintain the integrity of the emissions caps and allowance allocation system, AEP believes it is appropriate to retain such units in the program.

Senator CARPER. We were glad that you could come. Thank you for joining us, and thank you for your testimony.

I am going to ask Senator Voinovich to lead off the questioning for this panel.

Senator VOINOVICH. Thank you, Senator Carper.

Mr. McManus, GAO has done a study—and it has been mentioned several times in the testimony written—supporting a 90 percent stack by stack reduction in mercury emissions. But that study focused on a small subset of units, 25 out of several hundred coal units. GAO even acknowledged in their study that the results only applied to about three-quarters of the coal fleet based on their extrapolation of boiler configurations and coal type.

In sum, their results do not support that all units can achieve this 90 percent removal. Can you speak to your company's experience with mercury coal technology and the impacts that Senator Carper's proposal might have on the costs to your customers?

Mr. MCMANUS. Yes, Senator. We have been very active in trying to understand mercury control technology since the Clean America Rule was proposed. We have tested, on one of our large units, it has an SO₂ scrubber and an SCR for NO_x—

Senator VOINOVICH. Is that the Gavin plant?

Mr. MCMANUS. At Gavin plant, yes, and the coal benefit reduction in mercury. And we have seen substantial reduction in mercury, but it does not reach quite 90 percent. So, that is one concern we have, that if a lot of the reduction is to come from this combination of SO₂ and NO_x controls, can you reach 90 percent with that combination? We got in the 80s, but we did not quite get to 90.

We also have looked at activated carbon injection into existing precipitators. We work with ADA, actually, on some of that program. And we have seen varied results there on a unit at the Conesville plant, which burns a high sulfur coal. We saw a little mercury reduction because of an interference with sulfur dioxide and the GAO report actually points out that that is a complication on some high sulfur coal units.

We have also tested it on a unit with primarily Powder River Basin coal, and we saw substantial reductions there. We have actually implemented full scale on two 1,300-megawatt units in Indiana and activated carbon injection system. We are in early stages of operating that and do not have good data yet on the overall mercury reduction, but it has been very promising.

So, I think the developments in technology are very promising. The GAO report points to that. But it is on a limited number of units. And I did find interesting that three of the specific areas that they identified as a challenge, sulfur trioxide, interference with higher sulfur coal, units with hot side precipitators and lignite units, we have all three of those circumstances on the AEP system. And while we see promise in the technology and improvement, we have significant concerns still as we look at our system and how you would apply this.

A key aspect of it would be what kind of flexibility can you provide in the rules. So, we would really encourage, as you look at this provision in the bill, providing guidance to EPA on what types of flexibility they can provide as they establish the standard, because flexibility would be very important.

Senator VOINOVICH. The last time I looked at this real carefully, one of the arguments that was made was that the stage of the technology it would be extremely expensive for you to bring that technology in and that you were far better off putting the money into NO_x and SO_x because you got the coal benefits in terms of mercury.

And you are saying that, say the Gavin plant, you have done that, it has taken you up to what, 80 percent? And at this stage of the game, you probably have to find, depending on the time limit, some other technology that Mr. Durham may be selling or somebody else, to put that in. And of course if you do that, then you have got some impact, I would suspect, on your rate payers.

Mr. McMANUS. Yes, that is correct. With Gavin as an example, if we can achieve, you know, 80 to 85 percent with the coal benefits, to try and put an incremental technology on there to get that small difference to get to 90 percent, the sort of cost benefit of that is it is going to be more expensive because you are trying to get just a small increment.

The activated carbon technology—and Dr. Durham's testimony shows this—it is a relatively low capital cost and really looks like a good approach. But if you have to go to more extensive control technologies that are much higher capital costs, that is when the costs go up very high, and the impact on the rate payers would be significant.

Senator VOINOVICH. Thank you.

Senator CARPER. Let me just follow up with that.

Dr. Durham, do you want to comment at all on the exchange we just heard between Senator Voinovich and Mr. McManus? Anything you want to add or observe?

Mr. DURHAM. I think what is pointed out is the characteristic that all plants are not created equal. And so a lot of the data is around a lot of averages so, and as with every average there are performers that do a lot better and a lot worse. For example, the activated carbon, and what was mentioned in the GAO report, is looking at ones that are very low capital costs, relatively low operating costs, and some of those are getting well above 90 percent.

But there are these other cases. When you get up to a certain level, that could be an 80 percent, an 85 percent, and once you hit that roof, then the costs really go up to try to get further. We talk about variability in costs. We are not talking about 10 or 20 percent. When we come to a difficult situation that is operating at 80 or 85, it may be \$1 million or \$2 million a year of activated carbon to get to that level. To continue to push that up may take three times that amount just to go that much further.

So, those kinds of examples are why you need to be able to average that plant that was overachieving and getting 95 percent with that one that is getting 80 or 85 percent. That averaging does not create hot spots, because, as you know, when you are looking at an overall 90 percent reduction you cannot have many 80s or 70s in there and still maintain 90 much less 0. So, we are really talking about chasing very small numbers with very large dollars if you do not have that flexibility.

Senator CARPER. Secretary O'Mara is quite familiar with the large coal-fired plant, actually four plants, that we have in the southeastern part of Delaware at the Indian River Inlet and has

been very actively involved with NRG, the utility, to cause them to dramatically reduce their emissions in the years ahead. And as it turns out it has become a major stakeholder in offshore wind provider, which will hopefully be developed enough for the first wind-mill farm off the coast of our country in about 2 or 3 years.

At Indian River we have four plants. Some of them are pretty small, but one of them I think is quite large. But if I understand the flexibility you are talking about, Dr. Durham, they are all coal-fired plants. Hypothetically, if they had to reach a reduction of 90 percent mercury by 2015, if two of the plants were under 90 percent and two could be over, but if they are all co-located, the deal is at the end of the average of the four has to be 90 percent. Is that correct?

Mr. DURHAM. That is correct, or some whatever its average within the plant or larger, but the environmental benefit is the reduction in mercury and whether you have got a few pounds from one and few more pounds from another, the environmental benefit of the reduction is the same.

Senator CARPER. OK. Now what if instead of having those plants all co-located together in one part of Sussex County they had one or two in Sussex County, another north in Kent County, and another one all the way further north in New Castle County. Now, in that case, they could not, they would not have flexibility to balance one another off, would they?

Mr. DURHAM. Well, it depends on how you write the regulation. But again, if you are getting up to the 70–80 percent level at every one, what you have to do in order to achieve an overall 90, you are still only talking about very small differences between those plants.

Senator CARPER. All right. Thank you.

If I could, I want to come back to Mr. McManus again, if I may, about the question, particularly on SO_x targets, may be too far too fast. Talk with us, if you will, about the ability under the Acid Rain Program to bank allowances. My understanding is that utilities have, I think under the Acid Rain Program the cap on SO_x is about 9.3 million tons. Does that sound about right?

But I understand that utilities have been below this mark for the last several years, allowing companies to bank a large number of sulfur dioxide allowances. And you know better than we do what you all have in the bank. But how might that help you, or help AEP and others, to meet this challenge of too far, too fast?

Mr. MCMANUS. The banking provision is clearly very helpful to be able to rely on title IV allowances that are in the bank and have not been used to meet these caps.

The concern we have, and it really kind of goes to the first cap, EPA would have until the end of 2011 to establish new allocations going forward, and without knowing what those allocations are until 1 year before that cap kicks in, it is hard to say whether the bank is going to fully cover the needs in that first cap period.

And what we have seen in the title IV program, in the NO_x SIP Call and the CAIR Program, is companies tend to develop their compliance plans based on the allocations they receive and not assume that they can rely on the overall market to cover their needs because of the risk of relying on a market. If the market is not there, you do not have controls installed. And so again, with just

1 year between that allocation deadline when EPA sets the new allocations in the first cap, it creates uncertainty and concern.

On the NO_x side, I think our concern there is maybe more on the Western Zone than the Eastern Zone because the NO_x SIP Call is in place, and the CAIR NO_x Program is in place now in the Eastern Zone. We have seen significant reductions. As I indicated, the reductions on our system in the last 10 years, it has been 75 percent reduction in our NO_x because of the NO_x SIP Call and CAIR's annual program. So, we have seen significant reductions.

We do have some plants in Oklahoma that would be in the Western Zone. If that is a brand new program in 2012 that would require them to put controls on to meet a new NO_x cap; that is a very short amount of time to allow us to do that.

Senator CARPER. OK. Thank you.

Senator Alexander.

Senator ALEXANDER. Thanks, Tom. These are very helpful conversations.

Mr. McManus, how many coal plants do you have in AEP?

Mr. McMANUS. We have about 20 or so coal plants, the total number of coal units is in the 40s.

Senator ALEXANDER. How many have SO_x and NO_x controls on them now? Roughly.

Mr. McMANUS. Probably roughly about a dozen, and they tend to be our largest units—

Senator ALEXANDER. Big ones?

Mr. McMANUS. From 700 megawatt to 1,300 megawatt. So, it makes up a significant percentage of our total capacity.

Senator ALEXANDER. So, typically that is a scrubber and SCR both?

Mr. McMANUS. In our eastern fleet, scrubber and SCR, because we do have the NO_x requirements in the east. We do have two units in our western fleet that just have scrubbers.

Senator ALEXANDER. They just have scrubbers. And as I understand what you are saying, and I have heard from others, you are saying on some of those coal plants if you put on both the scrubber and the SCR, the SO_x and NO_x controls, you can get a lot of the mercury. Does it get into the 80s? Is that what happens? Well, let me not put words in your mouth. How much can you get with just those two devices?

Mr. McMANUS. The data that we have is for our Gavin Plant which is in southeastern Ohio, and it showed reductions in the 80 to 85 percent range. But it was based on short-term emissions tests, not on long-term monitoring data. So, we are very encouraged by that level, but we do not have a good sense for what we can achieve and maintain from a long-term perspective.

Senator ALEXANDER. But to reach 90, then, you would have to buy some other technology like Mr. Durham's technology and add it to the SCR and scrubber?

Mr. McMANUS. Correct. We would have to do something to supplement what we are getting in the coal benefits.

Senator ALEXANDER. But Mr. Durham, I understand you to be saying that—you are sort of arguing against yourself, aren't you, if you argue for an average because if they can get it to 85 without

your device on some plants, that is what they would do, and then they would not buy your product. Is that not right?

Mr. DURHAM. Well, our best interests are based around keeping coal as a viable option for power generation. So, it is in our best interests to make this as inexpensive as possible and still achieve the goals of reducing emissions.

Senator ALEXANDER. Yes, and I think our country's best interest is the same, which is to continue to have coal as a low cost big supplier of electricity. So if under our legislation we do not allow you to go below, you have to be at 90 percent smokestack by smokestack, so would it be possible to say, to put a floor under that? Would it make any sense to say that while you might be able to average your smokestacks to 90, but that in no case would any smokestack go below a certain level? Mr. Durham, what would you think of that?

Mr. DURHAM. I think any form of flexibility helps. Because, you know, for example, on the scrubbers and SCRs, there are units that are getting over 90 percent. But if you are stuck at that 80 percent, the additional equipment, to give you an example, a new power plant that is being built that has to meet a 90 percent because of Federal regulation will have not only that SCR and a wet scrubber, they will have to add activated carbon injection, they will have to add adding another chemical alkaloid to control the SO_x , they will have to add a wet ESP. And so you are talking about these huge incremental changes to get from that 85 to a 90. That is a must just to make sure you can get there.

Senator ALEXANDER. I understand. But you would not want, Mr. Durham, but you would not want to let any smokestack go very much below 90 because there is some evidence, maybe a lot of evidence, that mercury sort of goes up and comes down, unlike the SO_x and NO_x , which blows away, and so the people who live in the area of that coal plant would be exposed to more mercury.

What would be a reasonable level below 90 that any smokestack could—what would be the floor?

Mr. DURHAM. Well, again, if you are looking at having to average 90 percent, you can see you cannot get—you know, this is kind of like trying to maintain an A average in school and how many 70s—

Senator ALEXANDER. But Mr. McManus has 40 plants, so you might have one that is 40 percent and the rest at 90, and the people who live around the one at 40 percent would not be too happy.

Mr. DURHAM. I think that would be difficult to do.

Senator ALEXANDER. Mathematically difficult.

Mr. DURHAM. Mathematically difficult to do.

Senator ALEXANDER. Mr. McManus, any comment on the averaging from you about the opposing kinds?

Mr. MCMANUS. I agree with the point that if the target is 90 percent you cannot have many units that are significantly below 90 percent and meet your average. But to the extent that, in the direction that is given in the bill to EPA as it establishes these rules, you can encourage them to provide as much flexibility as possible. It certainly would help.

The Clean Air Mercury Rule had a national trading program for mercury, and we still do not understand why that was a concern

for many people. But does it make sense to do something that is on a smaller regional basis that would allow a form of trading or averaging a number of sources across a fleet or across a State? Those types of things, I think, can only help to meet the target.

Senator ALEXANDER. I appreciate the comment, Mr. Chairman. Just my own thought, I am not in favor of trading mercury, but some averaging might be worth our thinking about.

Senator CARPER. Thank you. Laura Haines is sitting behind me, on our staff, and reminded me that we do provide under our legislation some flexibility for EPA on this front, and I do not think they go in and do it on a boiler by boiler basis. But they are sort of interested in the overall site.

And I use my example of the Indian River Inlet facility where they have four plants. And one could be at 80, and the others could be at like 93. Would they be in compliance? But your point is well taken, and we think that we have invited some flexibility there for EPA, and we will look to see if there is some reasonable way to do a bit more.

Mr. DURHAM. Senator Carper, that plant is a good example because it is different ages of plants, equipment configurations, and so if you had that flexibility, just the planning process, it would be cheaper to get mercury control of some than the others. So, looking at each one of those as a separate entity makes that easier.

Senator CARPER. I want to come back to Secretary O'Mara, if I could, and Dr. Rizzo, if you would want to comment on this as well, that would be fine.

We have heard, at least from some northeastern States, that our nitrogen oxide targets for the East are not strong enough to help States meet new EPA ozone air quality rules. And I would just say, if we made some adjustments, made some adjustments to the Seasonal Ozone Program, Secretary O'Mara, do you think that somehow we could address those concerns?

Mr. O'MARA. Senator Carper, I think that it helps a lot. The challenge that Delaware faces is, frankly, if we controlled every unit in the States to the highest possible of 100 percent, we are still not in our attainment because of the import of emissions. And so I think that having seasonal allowances established by EPA would help.

I think there are some challenges with the approach that we need to work with EPA through. For example, EPA right now is looking at lengthening the ozone season for some States that are out of attainment. So, for example, Delaware's ozone season could be from March to October, compared to Massachusetts being from April to September.

And we also need to look at the winter peaks from NO_x that could result. But I think that clearly it is a step that helps address some of the concerns that we have to get into attainment as quickly as possible to bring the benefits of clean air to our residents as fast as we possibly can.

Senator CARPER. Mr. McManus, let me just ask you to kind of react to that a little bit. Do you think that it might be possible for us to meet a tighter mark for NO_x in the East, and again, going to this idea of having some seasonal adjustments, adjustments to the Seasonal Ozone Program, is that a live option in your view?

Mr. McMANUS. Yes, Senator, I think it is an option. The key to an issue like that is the timing. We have had, as I have indicated, we have put selective catalytic reduction on a lot of our units, our biggest units. But we do have a lot of smaller units that do not have that technology. We use more combustion controls, low NO_x burners, that type of control, but they do not achieve the level of reduction that a SCR does.

If we want to look at putting additional SCRs on, that is a long lead time capital program to do that. So, the timing of meeting an entire cap is pretty critical as much as sort of the level of that cap.

And then the other factor is, we do have a lot of smaller units that are of the 1950s vintage. We are looking at a lot of those units, and a lot of other companies are as well, in terms of how much longer would we continue to run those? Would you invest in the pollution control technology, the cost of higher capital scrubbers and SCR in those units? Would you make a decision to shut them down at some point, convert to natural gas, replace them with natural gas?

So, the timing of that is important as well in terms of our need to have capacity available to meet electric demand in balance, putting controls on, maybe retiring some units, building new units. So, timing is critical. But a lower cap, I think, clearly could be achieved.

Senator CARPER. Do you want to comment on that at all, Secretary O'Mara? You do not have to, but if you want to.

Mr. O'MARA. Well, I tend to agree that a lower cap could be achieved. The experience in Delaware has been that it is possible to put controls on these units at a fairly rapid pace. And some of the choices that have been faced by NRG, for example, that you referenced there, are raising some interesting issues about energy supply in the State of Delaware.

The one example I will use is a conversation we have been having in the State about Unit 3 at the Indian River Power Plant that you referenced.

Senator CARPER. That is the largest of the four, is it not?

Mr. O'MARA. Right. And they were planning on going ahead with all of the air controls, they did not see a major impact from the price of the air controls, they were still fairly competitive. They also had some interests in water issues at that location, concerns about fly ash, concerns about carbon emissions as well. And the company has decided that it is much more effective to put their investment into offshore wind and other cleaner sources of power than to try to rehabilitate an older unit.

Now, contrast that with a unit that is 15 years newer than that unit where they have decided to put on the emission controls that are required similar to what would be required in this bill, and that unit is still competitive, providing, you know, cleaner, but also cost competitive electricity.

And so I think that it does make sure that it protects the consumer, but it also encourages investment in innovative areas. But it gives people the flexibility to make that choice and ensure that we have both clean air and reliable power.

Senator CARPER. Good. Thank you.

If I could, for Dr. Rizzo, as a physician, as a leader in our medical community in Delaware, but also here representing the American Lung Association, can I just ask why does the America Lung Association support NO_x caps?

Dr. RIZZO. Well, as a non-profit and as a vision of a world without lung disease, anything that will improve pollution—and the lower nitric oxide is, the less ozone there is at ground level—will improve how people feel on a day to day basis, not only those who already have lung disease, but all of us are affected by these in different degrees. And seasonal variations occur because of the heat and certainly because of the ozone in the region that we deal with in the Northeast.

But improving NO_x and sulfur dioxide, anything to get those much, much lower than they are and with more rapid enactment of these is what the Lung Association pushes.

Senator CARPER. All right. Thanks very much.

Senator Voinovich.

Senator VOINOVICH. These units—how many units do you have, coal-fired units?

Mr. MCMANUS. We have total, around 50, I believe.

Senator VOINOVICH. Fifty coal-fired units?

Mr. MCMANUS. Coal-fired units, yes.

Senator VOINOVICH. OK. And many of them are smaller in terms of—what would you say the average megawatts would be from them, the smaller ones?

Mr. MCMANUS. The smaller units tend to be 100- to 250- or 300-megawatt units.

Senator VOINOVICH. If we did something with the technology on modular nuclear, those might be some alternatives for those facilities?

Mr. MCMANUS. We have looked at that; can you put in place a technology that can handle the full gas from a number of units on one site and get the economy of scale benefit from a cost perspective. So, that is a possible approach that could be used.

Senator VOINOVICH. OK. One of the things that we talked about is that—particularly when we were talking about carbon—is that in most of those plants you could make them more efficient. But the reason you do not is because, and Dr. Rizzo said, for God's sake, do not bother with New Source Review. So, what happens is that the utility decides to kind of keep it where it is at and not try to improve the efficiency. In other words, they would be producing more electricity, and you are getting the same amount of NO_x, SO_x, mercury and greenhouse gases.

So, with the New Source Review, your alternative would be on these smaller coal-fired plants to shut them down and to move toward natural gas. Is that correct?

Mr. MCMANUS. If ultimately you decide not to make the investment on pollution control technology, the alternative really is to shut them down, and the lead time to build new plants now, the lead time for a new natural gas plant is shorter than a coal plant. So, there would be a tendency to look at natural gas because you can get it in place quicker, again to meet the energy demand that we are trying to meet.

Senator VOINOVICH. Do you think as this legislation been drafted that you are going to see a lot more utilities shutting down and moving to natural gas? And if you do, what impact would that have at all in terms of the costs to the customer?

Mr. MCMANUS. I think under this legislation, under the existing regulatory program that Regina McCarthy talked about this morning, and just looking at the market in general, and then thinking ahead to possible CO₂ requirements, that we will see more and more units being shut down and a move to natural gas.

One example of that is that Progress Energy late last year announced their plans to retire a number of their smaller, older units by the 2017–18 period, in large part due to anticipated environmental cost exposure. So, to me that was sort of an early indicator of where we may seem more in the industry go in the future.

Senator VOINOVICH. So, if it was passed this way, you think there would be a tendency to shut them down and move toward natural gas?

Mr. MCMANUS. I think that is a real possibility, yes.

Senator VOINOVICH. I do not know the difference between the cost of producing electricity and natural gas versus coal. Is it about the same or a little bit more? What?

Mr. MCMANUS. Natural gas will tend to be more expensive. The key there will be the gas price. And what we have seen in recent years is wide fluctuations in natural gas prices. Most recently it has come down a little bit, in part because the economy just is not that robust now.

The shale gas resource is going to be pretty critical going forward in terms of, you know, can you meet the gas demand and at what price. So, that is a big uncertainty. But a potential, clearly a big potential going forward, to be able to rely on natural gas at a more acceptable cost than what we have seen in the past in gas prices.

Senator VOINOVICH. And the, in terms of natural gas, tell me, is it substantially—I should know this but I do not—in terms of NO_x, SO_x, mercury, greenhouse gas emissions. Let us just do the three Ps. How much, using natural gas, would bring down those pollutants?

Mr. MCMANUS. Burning natural gas for electricity, you do not have any SO₂ emissions, you do not have any mercury emissions, you do have nitrogen oxide emissions, but they would be lower than typically in a coal plant, but that will depend on what nitrogen oxide control technology you have on the plant.

Senator VOINOVICH. All right.

So, Mr. Rizzo would be real happy with more gas because of the fact that it would take care of the three pollutants that we are talking about in this legislation, I would suspect?

Mr. MCMANUS. I will pass. I will let Dr. Rizzo answer for that.

Dr. RIZZO. Yes.

[Laughter.]

Senator VOINOVICH. Well, I think that is about it. The only other last question would be that, I thought under the CAIR rule, that States like Delaware, they took into, for example—I mean, do you have an idea of what percentage—you are not meeting the ambient air standards right now? And you have done your thing, with getting them to come down and lower their levels of emissions. You

still have a lot of automobiles and other things. But about what percentage of your problem that you have and not meeting your ambient air standards comes as a result of transport of ozone?

Mr. O'MARA. I am just making sure I have the right number. On some of these, we have estimated that it could be as high as 90 percent from out of State sources given the size of the State compared to the generating sources that are close to us. And that is even with the improvements to Maryland's air quality in the past few years.

Senator VOINOVICH. Ninety percent from transport?

Mr. O'MARA. Ninety percent.

Senator VOINOVICH. I will be darned. Because I know that I thought that under the CAIR rule that we were going to absolve you from that. In other words, identify what is coming in, you doing your thing, and does that 90 percent include—

Mr. O'MARA. That includes some of the transportation sector itself on the I-95 corridor. And we have actually tried to explore all the tools at our disposal starting in State. But we have filed a petition with EPA under 126—

Senator VOINOVICH. 126.

Mr. O'MARA. And the challenge with a 126 is, the question is what is the region? And so for us it is really the Philadelphia metro region. But many of the emissions are coming from further upwind from States further to the west.

And so far EPA is struggling with this question because the original legislation really required them to look at that immediate region. But we are asking for—because as Senator Carper said we are that kind of tailpipe, across many States, not just the adjacent ones.

Senator VOINOVICH. Thank you.

Senator CARPER. I would just say, George, one of the frustrations for us is that I can remember times when we literally shut down our State's economy and would still be out of attainment because of the transport of the emissions from other places upwind.

Sometimes I like to close out a hearing. This has been, I think, a real good hearing, and I think we had good conversation and a productive one, a very constructive conversation. And what I am going to do in closing out here is just ask each of our witnesses if there is a point that you want to reiterate, make again, or if maybe you have sort of a different thought that you want to share with us as we close that has been brought out by the interaction that we have had with the panelists and those of us who are privileged to sit up here.

Is there anything else that would like for us to keep in mind as we walk away from here today, Dr. Rizzo?

Dr. RIZZO. I think the important thing is to not delay in whatever we can do to improve the situation. I think there were a lot of good ideas that have been talked about today, but certainly moving ahead and enacting laws that will help pollution. Every day is another life lost or more. Thank you.

Senator CARPER. Thank you.

Dr. Durham.

Mr. DURHAM. Well, just to reiterate. What we are saying, as equipment has been installed and operating, is performance is get-

ting better, costs are going down, we are having to redo our projections on the size of the market because the amounts of activated carbon are actually going down from the sites. There are still a number of difficult sites, and we are looking forward to trying to develop those challenges. But it sometimes helps having you adjust the laws of man because the laws of chemistry and physics that we are dealing with are not quite as flexible.

Senator CARPER. OK. Thank you.

Secretary O'Mara.

Mr. O'MARA. Thank you, Senator. I think that the message that we would like to relay is that, from the Delaware experience, that this can be very cost effective. We have seen, you know, the cost rate of being roughly about \$5,000 a ton for NO_x. That is cheaper than about \$10,000 a ton to buy a NO_x credit on the open market for an equivalent amount.

The technology works, and we are seeing incredible reductions on the units that we have. The challenge is that the scattershot State by State approach is not always successful. Pennsylvania really took—tried to have some very aggressive mercury legislation a few years ago that would have had a major benefit to the State of Delaware. That was struck down by the courts, and we continue to have pollution into our State.

So, without a national solution, we will continue to have these issues. Not any individual State can solve this challenge alone. And we have talked a lot today about the costs. We have not talked as much about the benefits. And our analysis shows that for roughly every dollar we spend on pollution control, we are going to save \$10 or more on health benefit savings.

So, the \$2 trillion number that you mentioned today, those are real dollars, and those are dollars that come out of people's pockets in Delaware and across the country. And those are dollars that could be more productively used in other parts of the economy.

And so when you look at the whole picture, we believe that this is an important step forward and we look forward to working with you on it.

Senator CARPER. Thank you so much.

Mr. McManus.

Mr. McMANUS. Thanks, Senator. I think I will step back and look at a little broader perspective here. Administrator McCarthy this morning mentioned the transition to an energy economy, and clearly it is a goal of the current Administration. It is an opportunity, from our perspective, that we see when you look at the electric sector. We see a clear transition occurring that will continue this year.

But it is more than just putting controls on existing power plants. It is what new power plants do we want to build, fossil fuels versus renewables versus nuclear. It is the smart grid concept, how do we make the way we use energy more efficient, demand side management. There is a lot going on across that.

All of that is going to take money to implement. In a very struggling economy right now, the challenge I see, really, is the timing of all of this. To achieve this transition over the next decade, it is a complex equation. And how do we move forward and set time lines that make sense, that allow us to be making the best choices.

You talked about certainty this morning. Certainty would be great, but we recognize that you cannot have certainty in everything. But a little better direction in timing that helps us do this transition would be extremely helpful, and we would welcome an opportunity to work with you to look for ways to implement appropriate timing for a lot of this.

Senator CARPER. Good. Well thank you for those closing comments.

In terms of—I certainly learned, I think I knew it before I was Governor, but I really learned it as Governor, is that businesses do need certainty and predictability. They did then and they do now.

We also need some certainty in figuring out how to ratchet down and rein in the growth of our healthcare costs. We are not competitive with the rest of the world when we spend twice as much as the rest of the world for healthcare and do not get better results, get worse results. And we have all these people who do not have healthcare coverage. You know, we have got to do better than that. We need some certainty toward getting us to a better spot there as well.

Dr. Durham mentioned certainty for him and his company going to the capital markets to try to raise money for another facility that they want to build. If we do not do anything, if we still end up battling it out in court with EPA and the CAIR rules and stuff like that, that is not the kind of certainty that he needs. And God knows what it is like following in Secretary O'Mara's shoes, trying to deal with all of this.

So, I am by nature an optimistic person. And I am leaving here today optimistic that we are on the right track here, that we are on the right track here. And I think that we have folks that are working in a spirit of cooperation. We know that we are in this together. And we know that we can do better. And we have got to do better.

I do not want to spend another 12 years in the wilderness, in and out of court, trying to figure out what regulations are going to be in effect and what are not, or are we ever going to legislate around here. I want us to legislate.

And in a season here in Washington where there is, frankly, not a lot of work across the aisle, unfortunately, I hope we can provide a model for how we can still do that, reach across the aisle, Democrats, Republicans, Independents, environmental community, medical community, non-profits, our utility sector, and we can still figure out how to get this done. And we need to. That is why the people in this country sent us here. And we are going to do our dead level best to do that.

I look forward to talking with Senator Boxer. I appreciate her very much letting me chair this hearing today. She has been very encouraging in her comments to me as to the way forward on this legislation. So, we are going to take it from here.

That having been said, it is almost lunchtime. We thank you all for spending so much time with us. Some of our colleagues who were not here, and some of those who were here, will want to submit some questions for the record. They have 2 weeks to do that. And I would just ask that, as you receive those questions, please do your best to respond to us promptly and fully.

Thank you again, and with that, this hearing is adjourned.
 [Whereupon, at 12:27 p.m. the Committee was adjourned.]
 [An additional statement submitted for the record follows:]

STATEMENT OF HON. JAMES M. INHOFE,
 U.S. SENATOR FROM THE STATE OF OKLAHOMA

Chairman Carper, thank you for holding this hearing today to discuss S. 2995, "The Clean Air Act Amendments of 2010," which you introduced along with Senator Alexander and others. On the day this legislation was introduced, Senator Voinovich and I released a statement extending a hand of cooperation in passing multi-pollutant legislation. As we said, "The goal of combining greater regulatory certainty under the Clean Air Act with significant advances in public health and the environment is a worthy and attainable one. We stand together today to begin a dialogue aimed at achieving that goal."

Today I repeat that pledge, and I'm sure Senator Voinovich will do the same. I hope that you, Senator Carper, as well as Senator Alexander and others, will join us in trying to reach agreement on this important issue.

There's a good deal of history behind legislative efforts to reduce sulfur dioxides, nitrogen oxides and mercury. I won't belabor that history, but I will note that several of us, including Senator Carper, made a good faith effort to reach bipartisan agreement on the Clear Skies bill in 2005. Ultimately that didn't happen, and instead we settled for a regulatory approach to reduce emissions. But without explicit authorization from Congress, the regulatory program, known as the Clean Air Interstate Rule, or CAIR, was struck down by the D.C. Circuit because EPA lacked the necessary legal authority under the Clean Air Act.

So where do we stand? We have emissions control projects on hold and a depressed allowance trading market. Without a new law from Congress, the ability to secure additional emissions reductions from power plants over the next decade remains unclear. Moreover, EPA is preparing a new emissions rule to answer the D.C. Circuit's CAIR decision, but again, without specific legal authorization from Congress, just what EPA can propose in light of that decision is highly uncertain.

We have a heavy burden on our shoulders to get this done. Yet I believe we can provide EPA with the legal authority it needs to get CAIR up and running again. At the same time, we can find common ground and pass a bipartisan 3-P bill. Now this won't be easy; Senator Voinovich and I have several concerns about S. 2995. I would say my leading concern is that the bill superimposes fairly strict emissions reductions over a short timeframe on top of several impending EPA regulations facing power plants. In my view, we should require significant emission reductions from power plants, but we also should provide flexibility for how those plants meet those targets.

So again, I say to my colleagues, let's work together on achieving the long sought goal of passing 3-P legislation. This could be a significant milestone that would produce real health benefits as well as ensure affordable, reliable electricity to consumers.

Thank you.

