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NOx STATE IMPLEMENTATION PLANS

HEARING

BEFORE THE

SUBCOMMITTEE ON
CLEAN AIR, WETLANDS, PRIVATE PROPERTY AND
NUCLEAR SAFETY

OF THE

COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS
UNITED STATES SENATE

ONE HUNDRED SIXTH CONGRESS

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NOx STATE IMPLEMENTATION PLANS

THURSDAY, JUNE 24, 1999

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

The subcommittee met, pursuant to notice, at 9:07 a.m. in room 406, Senate Dirksen Building, Hon. James M. Inhofe (chairman of the subcommittee) presiding.

Present: Senators Inhofe, Voinovich, and Lieberman.

OPENING STATEMENT OF HON. JAMES M. INHOFE, U.S. SENATOR FROM THE STATE OF OKLAHOMA

Senator INHOFE. The meeting will come to order.

Today's hearing is to discuss EPA's NOx SIP Call and how it affects States. While we originally decided to have this hearing before the court issued the stay on the SIP Calls on May 25, the hearing is now even more timely in order to hear how the States are responding.

There are a number of different issues concerning the SIP Call which are coming together and which will cause impacts on all the States involved.

First, a SIP Call which originally required the States to submit their plans to the EPA by this September has been put on hold by the court while they consider whether or not to overturn the rulemaking. This has created confusion within the States. I know that some States are going to continue to go forward with the SIP; others are submitting SIPs which would not have been approved by the EPA, and other States have decided not to submit SIPs until the court case has been decided.

A question I have for all the States is, if you go forward with something now, and either the courts or the EPA changes the rules during the process, what would be the effect?

Second, absent the NOx SIP Call, the EPA is going forward with Section 126 petitions which will require reductions starting in December, based on the 1-hour ozone standard. Is this the best use of resources? Once again, if the SIP Call or a modified version is reinstated next year, will the States and industry have made irreversible decisions regarding control measures, which they will be forced to change in mid-course?

And finally, overshadowing all of this is the NAAQS court case decision invalidating the new ozone standards. Much of the EPA's justification for both the SIP Call and the Section 126 petitions was based on the 8-hour ozone standard, which has been held unconstitutional by the court—in spite of the fact that Carol Browner doesn't believe it. I think it is important to note that while the Constitutional decision was a split decision, all three judges agreed that the standard could not be enforced.

I believe most of these problems could have been avoided if the EPA had bothered to work collectively with all of the regions affected by these decisions. Last year, a group of midwestern and southeastern Governors offered a compromise solution which would have addressed over 75 percent of what the EPA regulation would have accomplished, and this would have avoided the lawsuit and allowed the program to continue. Interestingly enough, the Senator to my right, Senator Voinovich, was the Governor who was the chairman of the committee of these regions, I believe, and was very much involved—was more involved, probably, than any other Governor of any State.

Senator Voinovich?

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

Senator VOINOVICH. Thank you, Mr. Chairman. I would like to thank you for conducting this hearing today on EPA's NOx SIP Call.

I always like to preface my remarks—and I think the members of this committee are getting tired of this—but I consider myself to be an environmentalist. I am the father of the Ohio Environmental Protection Agency. When I was in the legislature, I was responsible for creating the House Environment Committee, and I have tried to be very responsible throughout my career in government to be an environmentalist and to try to protect the health and welfare of our citizens.

I would like to give a warm welcome to Mayor Tom Nye of Hamilton, Ohio. Hamilton is a great city and is the seat of Butler County in southwestern Ohio.

Mr. Mayor, I would like to congratulate you and your citizens. They had a choice of either building a coal generating facility, and decided to spend more money to build a hydroelectric facility on the Ohio River to provide energy for your community, and I think that's the best evidence. You can always tell where people's principles are when you see what they do with their pocketbooks.

While I was Governor of Ohio I became concerned that the EPA was not taking into consideration cost benefits and sound science during their rulemaking process. I was particularly concerned about their ozone and particulate standards and the NOx SIP Call. In fact, Mr. Chairman, I spent over 100 hours in trying to convince EPA, the Clinton Administration, Members of Congress, and members of this committee that the cost of the new standards to this country far outweigh the benefits to public health and the environment. In fact, I think I spent some time with you a couple of years ago on this. In fact, according to EPA's own estimates, the cost for implementing the NAAQS standard for ozone exceeded the bene-

fits. The President's own Council on Economic Advisors predicted that the benefits would be small, while the cost of reaching full attainment could total some $60 billion.

I also do not believe the Administration knew enough about the science behind these rules to finalize them. In the case of $PM_{2.5}$, after the rule was finalized, the Administration has consistently returned to Congress to ask for funding to research the effects of $PM_{2.5}$, and it seems to me they should have done that scientific research before issuing the rule.

I would like to note that at the time, Senator Inhofe provided significant help to the States by amending TEA–21 to help provide more reasonable timelines to implement ozone and particulate matter requirements.

Just last month, a U.S. Appeals Court remanded EPA's ozone and $PM_{2.5}$ standards, ruling that EPA did not justify its decision with sound scientific evidence. Ohio was a party to this lawsuit, which began when I was Governor. The court didn't say that EPA couldn't regulate at these levels, but that EPA didn't give justification for doing so.

That's been my point all along. I have argued that the NAAQS standards and NOx SIP Call were going to be costly to implement, and that the investments to achieve them could not be supported by sound science.

Shortly after the NAAQS decision, the same Appeals Court granted a State petition to stay the NOx SIP Call until it decided on the lawsuit by Ohio and other States.

I believe one of the most obvious examples of EPA's lack of regard for reasonable approaches was witnessed by midwest States during the Ozone Transport Assessment Group process, and announcements of the final rules for the NOx SIP Call by the EPA. OTAG is a partnership among 37 States, including Ohio, environmental groups, and industry. It recommended NOx reductions in amounts up to 85 percent, along with completion of sub-regional models. Ohio concurred with this recommendation. I recall that at the time there were some people who argued that we shouldn't; we concurred with that, but we did say that we ought to look at sub-regional modeling to see what could be done to achieve the standard.

However, USEPA chose to impose an across-the-board uniform 85 percent reduction, despite data demonstrating little or no impact from the many States in OTAG. In essence, USEPA simply chose the level of pollution control it wanted utilities to achieve, and implemented it without regard to air quality impact.

The midwest and southern Governors proposed an alternative NOx strategy that made much more sense for meeting the new 8-hour ozone standard—by the way, that's the standard that the court has overruled. It required a good faith downpayment of 65 percent reductions. In 2001, States would analyze whether additional controls were necessary to meet the 8-hour ozone standard by 2009. By the way, that's a full year earlier than permitted under the USEPA approach. Then if additional controls were necessary, they would have been implemented; however, if the 65 percent reductions met the standard, then additional and very expensive controls wouldn't be necessary. That's logical.

The Governors thought it was a good and fair proposal that would have achieved attainment of the 8-hour standard, but EPA ignored this reasonable approach and finalized the most stringent controls possible for NOx in 2003. The final rule also sets up a system to wait until 2007 to determine whether it works. Ironically, USEPA's final NOx rule sets up the possibility that attainment of the 8-hour ozone standard would actually be achieved a year later than the one the Governors proposed as an alternative.

How could EPA justify going against experts in the States? How are human health and the environment protected under a model that would achieve the standards a year later than the Governors' proposal? I think this is another example of EPA being arbitrary and capricious. Instead of trying to work with reasonable people who care about the environment, they went ahead and said that it had to be done their way. I strongly believe that if EPA had worked with the States—worked with us—the lawsuits, like the one invalidating the NOx SIP Call, wouldn't have taken place. We could have averted that. Now it's in the court's hand to determine the validity of the NOx SIP Call, but I think the underlying question is what's going to happen with the Section 126 petitions. We will hear some testimony about that today.

Despite pending litigation, it seems to me that utilities and States are planning to move forward with reasonable NOx reductions. I think the message that EPA should get is that the States involved in this issue want to work and go forward. The question is whether they will be able to do that.

I thank you, Mr. Chairman, and I look forward to today's testimony.

Senator INHOFE. Thank you.

Senator Lieberman?

OPENING STATEMENT OF HON. JOSEPH I. LIEBERMAN, U.S. SENATOR FROM THE STATE OF CONNECTICUT

Senator LIEBERMAN. Thanks, Mr. Chairman.

This is one of those mornings on which we are reminded that America is a big country, different regions, different points of view, but I thank you very much for holding this hearing. I am personally pleased to welcome Jane Stahl from Connecticut's Department of Environmental Protection as one of the witnesses today. I look forward to hearing her testimony on this important issue.

Ms. Stahl is here today, I suppose, for the same reason that I was very anxious to be here myself, which is to express our dismay that Connecticut is literally choking on the exhaust of others, that the health of our residents is at risk, and that our government has been rendered all but powerless to do anything about it.

If that sounds strong, it is meant to. Although the subject and the vocabulary of our discussion this morning may seem arcane, sometimes theoretical, the consequences involved are real and they are threatening.

The problems that I have just described are not new to Connecticut or its neighbors. We have been plagued by the transport of ozone air pollution, which is, as you know, the main harmful ingredient in smog, from midwestern States since the passage of the Clean Air Act Amendments of 1970. From our perspective,

"plagued" is no exaggeration. Transported pollution into our region has been measured at levels that exceed the public health standard by 80 percent. Ground level ozone damages lung tissue, reduces lung function, and sensitizes the lungs to other irritants. Children are particularly vulnerable to these ailments.

There is, in fact, a tremendous body of scientific research that has been developed and reviewed by the Ozone Transport Commission, a commission created by the Clean Air Act Amendments of 1990, which helps us understand both the sources and the consequences of transported pollution. Building on that research, a partnership effort by EPA, the States, industry, and environmental groups was instituted in 1995 to develop air quality modeling and recommendations for solving what we all acknowledged, including all of us here today, to be a complicated problem. In October of last year, EPA issued a final rule that reflected the input of these diverse stakeholders. The NOx SIP Call Rule, as it is known, established a regional cap-and-trade program for large sources of NOx emissions in 22 eastern States and the District of Columbia.

In my view the rule is not only sensible, it is really essential as a tool to protect public health and retain flexibility in implementing pollution reductions. Unfortunately, as has been indicated just last month, the D.C. Circuit Court issued a partial stay on that proposed rule. The stay, as I read it, was not issued because there is a finding that the rule is not needed—the air is just as dirty today as it was before the ruling—it was issued because the rule is caught up in a separate dispute regarding delegation of authority in establishing new standards for measuring ozone pollution.

Personally, I am hopeful that this challenge will be rejected; but in the meantime, I do think it's important to emphasize what is not being challenged, which is the need to establish standards to protect the public from the dangerous health effects caused by smog and soot. It is precisely this public health concern that means that we can't turn our backs on instituting a regional and responsible plan to curb dangerous levels of pollution. The NOx SIP Call Rule would, I think, achieve significant air quality benefits in an equitable manner.

Approximately 67 million people east of the Mississippi River live in areas that have unhealthy levels of smog. EPA estimates that every year implementation of the controls proposed in the regional plan are delayed, there are between 200 and 800 premature deaths, thousands of additional instances of moderate to severe respiratory symptoms in children, and hundreds of thousands of children suffering from breathing difficulties. This threat was localized over the Memorial Day weekend recently when the citizens of Connecticut suffered through several days of smoggy air that prompted State officials to ask people to drive less, avoid drive-up windows, and put off mowing the lawn. Health officials advised people to stay indoors and to avoid outdoor work and exercise. Just yesterday in our State's largest newspaper, the Hartford Current, there was a story about an epidemic of asthma among children living in Hartford, which I would guess has something to do, of course, with the quality of the air they're breathing.

Court actions in this case are not just tying the hands of EPA. They also mean it is effectively impossible for the State of Con-

necticut to protect our own citizens, because Connecticut cannot achieve pollution standards required by law without regional action and regional help. In fact, there is one study—one modeling exercise—done that concludes that even if Connecticut removed every car from our roads, we would still be in violation of the 1-hour standard. Some say that required regional controls are extreme, burdensome, even draconian, some say, and will lead to a disruption of power service delivery; yet Northeast Utilities, which of course is a Connecticut company, has demonstrated that the reductions are achievable and that technology is available to meet the requirements without disruption to customers. The Tennessee Valley Authority has also announced plans to implement state-of-the-art controls to address ozone pollution.

What may well be burdensome—and perhaps even draconian, at least in the contemplation of those who live in my State and neighboring States—are the costs that the northeast States will incur if we fail to adopt regional controls. Right now, utilities in the southern and midwestern States emit over 4.5 times more NOx emissions than northeastern utilities. A study done by the Northeast States for Coordinated Air Use Management found that we will have to pay between $1.4 billion and $3.9 billion for additional local controls to reduce ozone pollution if six upwind States fail to implement the NOx rule requirements.

So, Mr. Chairman, ozone transport is a problem that is real, and from the point of view of our State of Connecticut, it is harmful. It can only be solved with a regional remedy.

The NOx SIP Call Rule, in my opinion, is a reasonable and balanced remedy, allowing States flexibility in achieving reductions needed to protect public health.

I look forward to hearing from our witnesses this morning about how we can work together to achieve the overriding public interest here, which is safeguarding public health.

Thank you, Mr. Chairman.

Senator INHOFE. Thank you, Senator Lieberman.

I now ask our first panel to be seated at the table. The way we have divided the panels today is to start with the Honorable Sharon Treat, Maine State Senate, and you are the Senate Chair of the Joint Standing Committee on Natural Resources, I understand.

Mr. Wayne Hill of Gwinnett County, in Georgia, the County Commissioner.

And the Honorable Tom Nye, Mayor of Hamilton, Ohio. I have to say this to my friend, the Mayor, I was the mayor of a major city for three terms, and I know what a hard job it is. There's no hiding place.

We will hear from each one of the witnesses. I would tell you that while we don't have many members here, all the members are represented here. You will receive questions for the record; we will keep the record open so that you will have an opportunity to respond to these. As you give your opening remarks, your entire statement will be made a part of the record, but I would ask you to try to confine your opening statement to 5 minutes, and that's why we have these cute little lights up here. After you all three have had your opening statements, we will have rounds of ques-

tioning from this table here, and I suspect other members will be coming in during the course of this.

So we will start with you, Senator Treat.

STATEMENT OF HON. SHARON TREAT, MAINE STATE SENATE, SENATE CHAIR OF THE JOINT STANDING COMMITTEE ON NATURAL RESOURCES, GARDINER, MAINE

Senator TREAT. Thank you, Senator Inhofe and members of the subcommittee. Good morning. My name is Sharon Treat, and I am a State Senator in Maine, where I chair the Natural Resources Committee. I also serve as one of Maine's two representatives on the Ozone Transport Commission.

As the only representative on this panel of more than 20 States which are supporting EPA's efforts to control NOx pollution under Section 110 of the Clean Air Act, I will try today to present a regional perspective.

At the outset, let me stress that the northeast States are not asking our upwind neighbors to take any regulatory actions that we are not willing to impose upon ourselves, nor are we asking upwind States to take actions that only benefit distant downwind States. The reality is that, upwind or downwind, ozone pollution is a problem that needs to be addressed. It affects our most vulnerable citizens, children and the elderly, and it knows no political boundaries.

Already this year the smog has been really bad, as has been mentioned already, and summer just started on Monday. This is not just a northeast phenomenon. Between March 12 and June 12 of this year, Ohio experienced 181 exceedances of the health-based 8-hour ozone standard. Michigan had 76 exceedances; North Carolina had 43, and Georgia, 39. Also, North Carolina and Ohio on several occasions over the past weeks have exceeded the old 1-hour standard. So clearly, any reductions in NOx emissions from upwind States will benefit the citizens of their States and their States' environment, regardless of EPA's standard.

Over the past 25 years a significant amount of research has documented the long-distance movement of smog. Levels of ozone transported are clearly beyond the control of local reduction efforts within the northeast corridor. Maine is uniquely situated at the receiving end of much of this smog. Locations along the Maine coastline far removed from urban centers, such as Acadia National Park, typically exceed the 1-hour Federal ozone standard during the late evening and overnight hours, times during which ozone production is not possible due to the lack of sunshine, so it is not a local problem.

How can we justify the continued operation of old grandfathered power plants without modern pollution control equipment in any of our States? Maine and many rural areas of the northeast will be unable to achieve clean air as long as these old power plants operate to 1950's standards.

Let me be clear. Regional upwind control efforts are needed to augment—not to replace—additional local measures in downwind States. We are not asking somebody else to clean up our problem. We only ask that local measures go toward achieving clean air, and not for offsetting somebody else's pollution.

I would like to put something in perspective here. Consider that NOx emissions from all source categories, including automobiles, trucks, and power plants, in Maine's largest city, Portland, totaled almost 28,000 tons in 1996. By comparison, a single power plant in southern Ohio emitted over four times as much NOx during the same year.

While the State of Maine is itself not subject to the NOx SIP Call, Maine's Governor, along with other northeastern States, has committed to achieve the same NOx reductions from major stationary pollution sources within our State. In fact, in 1994 we joined with 11 other States and agreed to reduce NOx emissions from electric utilities and large stationary sources by up to 75 percent, roughly twice the mandatory reductions required under the Clean Air Act. Mainers and other northeasterners have been willing, time and again, to impose restrictions on themselves and their industries to control pollution, but without reductions in upwind States we will continue to have a smog problem.

Speaking as an elected official—and I would say, a long-time supporter of stringent in-State controls, both on stationary and mobile sources, not a politically unrisky position to take, I might add—I can report that this really creates a policy problem in our State. When scientific modeling and data demonstrate that implementing an IM program will not alter our attainment status, it is understandable that the inconvenience and cost of additional controls, such as IM programs, can be a tough sell, and it has been.

This is not an abstract issue of meeting or not meeting Federal standards. It is a question of public health, as Senator Lieberman has pointed out.

There is also a matter of our environment and our economy. Maine's economy is dependent on her natural resources: forestry, fishing, agriculture, and tourism. All are harmed by the effects of ozone and acid rain caused by NOx pollution. Loss of fall foliage damages a multi-million dollar fall foliage tourism season. Reduced sugarbush—maple syrup-producing trees—comes from acid rain. Algal blooms in our marine ecosystems result in damage to our fisheries. Need I mention Maine lobster, to make my point more clearly?

In conclusion, for over 20 years our country has perpetuated an illogical system in which pollution is free from the law as soon as it crosses State lines. After 20 years of collecting and reviewing the scientific data, EPA has finally responded with what we consider to be a measured first step to diminish the magnitude of NOx transport across State lines. All States will benefit from this cost-effective pollution reduction proposed by EPA.

It is unfortunate that the inaction on the part of our neighbors has forced us in Maine and the northeast to turn to the Federal Government for relief. As a State legislator, I would have preferred solving this problem with my fellow legislators at the State level; sadly, that option has not—and apparently will not—present itself. It is precisely when States cannot solve problems on their own that Federal action is required. EPA should be commended for its recent efforts to bring science and fairness back to our air pollution control efforts.

Thank you.

Senator INHOFE. Thank you, Senator Treat.

Mayor Nye?

STATEMENT OF HON. THOMAS NYE, MAYOR, HAMILTON, OHIO

Mayor Nye. Good morning, Mr. Chairman, Senator Lieberman, my own Senator Voinovich. My name is Tom Nye, and I am the Mayor of Hamilton, Ohio, a city of 65,000 people located in southwestern Ohio.

Hamilton is a public power community that has owned and operated our nonprofit municipal electric system for our citizens since 1893. I testify on behalf of the Ohio Municipal Electric Association and its 80 public power communities on the need for USEPA to pursue cost-effective strategies for the control of NOx emissions.

EPA's current NOx strategy has not adequately recognized the potential impacts on small public power communities. Public power communities urge EPA to adopt meaningful, yet reasonable, NOx reduction policies that mitigate the impact on small entities and localities.

Like all communities, Hamilton seeks to provide a high quality of life for our citizens and to attract and maintain businesses and jobs; however, this depends on providing cost-effective public services to residents and private sector employers. That is why Hamilton operates a municipal electric utility, and that is why we are very concerned that EPA's current policies may unduly raise costs to our customers and threaten the very viability and competitiveness of our public power system.

Hamilton owns electric generation facilities totaling 206 megawatts in capacity. This generation includes Hamilton Boiler No. 9, one 50-megawatt coal-fired boiler that will be subject to EPA's NOx SIP Call, FIP, and Section 126 control strategy. Hamilton also owns a 70-megawatt hydroelectric plant, located in the Greenup Locks and Dam Facility on the Ohio River. This is our primary source of power, backed up by Boiler No. 9 when river flow conditions do not permit generation.

Hamilton's Boiler No. 9 is facing significant challenges under EPA's proposed NOx strategy, which I have detailed in my written testimony. I explain that Hamilton's plant could be seriously underallocated NOx allowances due to our voluntary pollution control activities and our reliance on the clean hydroelectric generation. Under EPA's proposed plan, we would be limited to operating for only 66 days out of 153 days in the summer ozone season, and face control costs of more than $7,000 per ton of NOx removed.

Hamilton's concerns mirror the overall concerns of Ohio public power about EPA's NOx control strategy. EPA's strategy goes beyond what is necessary to protect the health and the environment from ozone pollution and requires NOx controls that are not cost-effective. Indeed, EPA has recognized the potential for disproportionate impacts on small entities from these rules, and it has even issued guidance to the States calling for the mitigation of these impacts. However, EPA has not made sufficient efforts to implement such policies itself under its own NOx control strategy.

Hamilton encourages Congress to continue playing a role to ensure that air pollution programs are effective and reasonable. Congress should consider the following four proposals.

First, Congress should establish a NOx cap-and-trade system for the eastern United States. Localities, industry, and EPA agree that market trading of NOx emissions is the only cost-effective manner to achieve NOx reductions. EPA is attempting to implement such a system; however, any system implemented by EPA under the current regulatory climate could be confusing, expensive, and ineffective, because it will be applied through a hodgepodge of voluntary State programs and Federal mandates. This situation deserves your Congressional attention.

Second, Congress should examine whether the SBREFA act, the Small Business Regulatory Enforcement Fairness Act, is working at EPA.

Third, Congress should consider phasing in NOx controls for small sources, such as Hamilton's. Small entities and sources need compliance flexibilities and extended deadlines to cost-effectively comply with Clean Air Act regulations. Hamilton suggests that any regional NOx control strategy be phased in, similar to the successful SO_2 acid rain program. In this way, larger sources of pollution are the focus of the initial reductions, which will ensure maximum environmental benefit, stimulate the development of control technologies and efficient pollution trading programs, and provide small entities with adequate time to meet their compliance obligations.

Finally, Congress should establish a "clean air partnership fund." EPA has proposed a new program that would provide grants directly to local governments for innovative, voluntary approaches to air quality improvement. This clean air partnership fund is exactly the type of assistance that localities like Hamilton need to make progress. We urge Congress to give serious consideration to this proposed program.

In conclusion, Hamilton and the Ohio Municipal Electric Association support effective Clean Air Act requirements to reduce NOx and ozone pollution, but EPA needs to be more vigilant in identifying how these regulations might impact small businesses and local governments who need compliance flexibility in order to remain viable.

Thank you.

Senator INHOFE. Commissioner Hill?

STATEMENT OF HON. F. WAYNE HILL, GWINNETT COUNTY COMMISSIONER, LAWRENCEVILLE, GEORGIA

Mr. HILL. Thank you, Mr. Chairman, and thank you, Senators, for giving me an opportunity to come today and share a little bit about my region.

I am the chairman of a Board of Commissioners in a county that had 42,000 people in 1960; today, we have over 500,000——

Senator INHOFE. Would you tell us where your county is?

Mr. HILL. I am in the northeast section of Atlanta. I am part of the 10-county Metro Atlanta Region.

I also serve as chairman of the Atlanta Regional Commission, and I am sure that with the air quality problems that you've heard about in Atlanta, you are very familiar with what we are dealing with there.

While I am very sympathetic with others who are affected by reason of air quality, I realize there are some prices to pay for this. My very own granddaughter has respiratory problems, so I'm very aware of what ozone does. I think that because someone took a look at the air quality in the Atlanta area, we can truthfully say that the air quality is better in Atlanta than it was 25 or 30 years ago.

As I mentioned earlier, I've been very involved with the State and the Atlanta region in trying to solve our problems, and ARC and our State EPD are working very hard to bring our region into compliance.

I want to talk about a couple or three things here today: coordination and consistency at the Federal level; complexity of the clean air issues, and consequences of regulations—or change in budget, is the way I would phrase that.

Let me talk about consistency. We appreciate what you folks do up here, but a lot of times we find out that different agencies interpret things very differently, and it throws us at the local level into a very hard position. Some of the decisions that have been made at the local level have thrown our county into very serious problems. Right now we have Federal projects that have been withdrawn because of some of the ozone problems that we have. We have four-lane roads going to two lanes; we will have a four-lane on each end. We have bridges that are two lanes, where we can't get our people across. I urge you to look at that as you move forward to change budgets and realize what effect it has already had on some regions.

One of the other things that I want to talk about a little bit is that we've heard that Atlanta is the "poster child for sprawl." I think some of the issues that we're dealing with here are creating more and more sprawl. As we push people farther out, then you're going to see our areas spread; and instead of combining the problems of 13 county areas, we're going to have problems statewide. To give you an example, I own a small cabinet company. I am three miles from the county line, or the attainment area. If I were three miles up the road, I wouldn't worry about clean air regulations in the Atlanta region. If we change these budgets, we're going to spread that even farther. People will move out even farther.

Third, I want to touch on the consequences of regulations. As I mentioned earlier, we have roads that are being affected in our county. We in Gwinnett County have voted a sales tax, and it's very hard for me sometimes to explain to the public in general why we can't do things. The Atlanta area has never been in conformity. If we drop these budgets, we don't know if we ever will get into conformity. We have been working very hard for a long time to get our area to where we can meet the standards that we have today. If we're not able to meet those standards, we fear—and my own Senator Coverdale and I have discussed this—we fear we are going to shut our region down. I hope this group and the Congress will take into account what it is going to do to our economy.

I am reminded of something that one of my close friends says: "When we are hungry, we have one problem. When we are prosperous, we have many problems." I think that's where we are with some of these issues that we are dealing with here. If we were not a prosperous Nation, I'm not sure we would be paying as much at-

tention to the clean air issues, or cleaning it up even further than we are today.

So I would like to say about the 214-ton emissions budget we have in the Atlanta area, that we think that we can meet it. If it drops lower, we don't think we're going to make it; so we have to be very careful of what we do. Atlanta and our region pretty well drive the southeast. We do not need to be where we are hunting jobs or hunting places for people to travel to.

We've got to find a way to do this other than just cars, but any time we move into the power plants, as the Mayor said here, the cost goes up. That affects our citizens. Everybody will tell you, "Yes, we want cleaner air." I don't think you'll find anybody who won't. But when we put a cost on it, I think you're going to see people begin to think that we went too far.

My theory is that if we are not careful—it's kind of like a pendulum—we'll swing over this way; if we go completely over here, people are going to want to throw out a lot of our standards completely. We have to get it back to the center. We have to be sensible and do the things we need to do.

Thank you for letting me be here today and I look forward to any questions you might have. It's an honor, and I appreciate what you folks are trying to do.

Senator INHOFE. Well, thank you, Commissioner. I think it's a good way to have this hearing, to have a State represented, and a city, and a county, because you have slightly different perspectives.

I will start, Mayor Nye, with you. I understand that the EPA has an estimate that they have been using on cost per ton for removal of $1,468, and you had an independent engineering group that has come up with a figure of $7,554 per ton.

I have been very critical of the EPA for using inaccurate figures. Back during the NAAQS fight, they originally were saying that it was going to cost $9 billion a year—that was the EPA's estimate—but the President's Economic Council came up with a figure of $60 billion a year, then the Reagan Foundation out in California came up with a range between $90 billion and $150 billion.

So I would like to ask you the obvious question here. What do you think accounts for this disparity in the cost? Then I would like to ask each of the others whether you have done some estimates, either on a statewide basis or a countywide basis, in your areas.

Mayor Nye?

Mayor Nye. I think there's a fairly easy answer to that. As I mentioned, we have the one boiler that will be affected by this NOx SIP Call. It is a 50-megawatt unit. The technology that we will have to purchase will be the same, whether for 50 megawatts or whether it's 500 or 1,0000 megawatts, which is pretty typical for some of the IOUs, the Investor-Owned Utilities. We're going to have to spread those costs over our base, our citizens. We serve as a public power community; we serve our citizens. We are not serving our stockholders; we are serving our citizens, and we will have to spread that cost over a much smaller base than some of the bigger companies will. I think that's really the issue at hand here.

Senator INHOFE. Well, how about you, Senator Treat?

Senator TREAT. Maine has been part of the OTAG process, which is a regional group put together to do the cost estimates for 37

States, including many of those represented here today. OTAG found that controlling pollution from power plants was in fact a most effective cost-effective way of addressing this issue. Obviously, there are a lot of other controls out there.

I think we have to ask the question, what are the costs of not taking action? That's what I tried to point out in my testimony. We have a natural resource-based economy, and although we have some manufacturing, our environment is our economy, and there will be significant economic costs to the people in our State if we don't take action.

Senator INHOFE. Mr. Hill?

Mr. HILL. In the county we don't have anything that I can tie it to. I have to look at the overall region whenever I talk about costs. I do know that our power companies have come up with some numbers, and it's going to be pretty astronomical, what will be passed on to our citizens. But I don't have anything like the Mayor does that I deal directly with.

Senator INHOFE. Well, Mayor, I'm going to ask you to submit to this committee your engineering report and any supporting documentation, and then I will use it for this committee, but I will also submit it to EPA to get their response, because I think that is significant when we come up with a disparity like that.

Mayor Nye. Mr. Chairman, if I could just followup also, one of our concerns, as I mentioned earlier, is whether SBREFA is being taken into account here. We feel it is not, and we feel that EPA should be held responsible, relative to the SBREFA concept. Our unit—our municipal production—is really a small business, so we feel that that entire SBREFA issue should be looked at very carefully; and if you just look at that, I think that this issue would be deemed quite different.

Senator INHOFE. All right.

Senator Lieberman, go ahead an take any time you want, 7 or 8 minutes; don't necessarily comply with the 5-minute rule.

Senator LIEBERMAN. Thanks, Mr. Chairman. I'll try to stay within 5 minutes.

On the question of costs—Mr. Chairman, I would like to ask that I be able to submit for the record letters and study done by Northeast Utilities System on the costs of complying with some of these things.

Senator INHOFE. Without objection.

[The referenced material follows:]

NORTHEAST UTILITIES SYSTEM,
Berlin, CT, July 31, 1998.

VP–98–51

MS. CAROL BROWNER ADMINISTRATOR,
U.S. EPA,
401 M Street SW,
Washington, PC 20460

DEAR MS. BROWNER: I understand that you met last Friday with several utilities in the Northeast to discuss the companies' experience with nitrogen oxide controls. We were unable to attend the meeting, but I wanted to relate to you our experience with Selective Catalytic Reduction (SCR) technology, which we installed at PSNH's Merrimack Station In 1995. Mr. Helms of your staff visited our Installation in October 1997.

Three issues being debated are the technical feasibility of SCR, the feasibility of retrofitting many units by 2003, and potential impacts on electric system reliability. In our experience the Merrimack Station SCR system is effective in removing NOx, can be installed fairly quickly, and the installation has minimal impact on the availability of the generating unit.

We decided to install an SCR system at Merrimack Unit 2 in response to New Hampshire's NOx RACT regulation. That regulation provided us with the flexibility to install and operate the least cost system to meet our emissions requirements. Despite no U.S. utility coal-fired boiler experience at that time, its international success made SCR our choice. The retrofit project took less than a year from inception to operation. While that was an accelerated time schedule, it is a testament to the capabilities of constructors and suppliers in today's marketplace. The Merrimack Installation was a fairly complex retrofit requiring considerable engineering effort, yet, despite the complexities of the site and the winter construction schedule, actual construction was completed in 5 months. The construction was timed to coincide with a scheduled maintenance outage; the SCR was built alongside the powerhouse while the generating unit was on line, and the final connections were made during the maintenance outage. Installation of the SCR only added 1 week to the pre-scheduled outage duration.

Performance of the SCR has met all of our initial expectations. The unit met the design reduction levels, and did so at a total annual cost of about $400 per ton of NOx reduced. The cost per ton increases to about $600 if we only consider ozone season reductions. The SCR was designed to achieve greater reductions through the addition of more catalyst, which live did earlier in 1998. Preliminary results indicate a reduction of 85 percent from our original baseline emission rate.

We expect that other companies' experiences will be similar to ours, once they commence the installation and operation of SCR's. There appears to be adequate vendor capability and interest to meet the 4-year schedule envisioned in the SIP call. We don't think our 1-year project length will be unique; in fact, we are considering a second SCR at another coal-fired unit on our system. Should we decide to go forward, we would expect this second unit to be operational by June 1999.

The SCR system at Merrimack has had minimal impact on the reliability of the generating unit. During our 3 years of SCR operation, the generating unit has achieved some of the highest levels of availability in its 30-year history, and established new "longest continuous operation" benchmarks.

In our opinion, installation of NOx controls to meet the proposed budgets across the 22-State region is entirely feasible, can be achieved before the 2003 ozone season, and can be achieved with little (if any) impact on system reliability. We hope to meet with you in September to discuss this and other Issues. Please call me (and/or another contact?) If you have questions or would like to discuss this prior to September.

Very truly yours,

WILLIAM J. NADEAU,
Vice President for Fossil/Hydro Engineering and Operations,
Northeast Utilities System.

NORTHEAST UTILITIES SYSTEM,
June 25, 1998.

D12678

Air and Radiation Docket and Information Centre,
Attention Docket A–96–56
Environmental Protection Agency,
401 M Street SW
Washington DC 20460

RE: SPA SUPPLEMENTAL PROPOSAL TO REDUCE REGIONAL TRANSPORT OF OZONE

DEAR SIR OR MADAM: The following comments on EPA's proposed rule to reduce regional transport of ozone through a NOx cap and trade program in the Eastern States are offered on behalf of the Northeast Utilities System (NU) companies, which include The Connecticut Light and Power Company, Holyoke Water Power Company, North Atlantic Energy Service Corporation, Northeast Nuclear Energy Company, Public Service Company of New Hampshire, and Western Massachusetts Electric Company.

NU companies constitute the largest electric system in New England, serving 1.7 million customers. We currently participate in a variety of Clean Air initiatives, in-

cluding EPA's Green Lights programs, and actively participated in the Ozone Transport Assessment Group (OTAG).

NU has spent almost $40 million in the last 7 years to reduce fossil plant NOx emissions and comply with the Clean Air Act Amendment (CAAA). With those substantial efforts, NU has system-wide NOx emission rate which ranked tenth best among the 50 largest Eastern utilities, according to a 1996 NRDC Benchmarking Report "Air Emissions of Utility Electric Generators in the Eastern U.S."

EPA's proposed rule represents an effective approach to addressing regional ozone transport by achieving the necessary NOx emissions reduction from all sources across the 22 eastern States. Our comments address the following areas:

Allocation Method
EPA's Corrected Allocation Figures
Trading Program
Voluntary Inclusion of Other States
Phase II NOx Exemption
Timing of Reductions

In addition NU wishes to reiterate comments made in its March 9 letter (attached) commenting on EPA's original proposal.

Allocation Method

The recommended allocation method should be based on actual heat input (in mmBtu) of the unit as proposed. However, NU is concerned that EPA is apparently suggesting that the SIP approval process will be more difficult and time consuming for States that depart from the recommended approach. (63 FR 25931) EPA should not question a State's allocation method as long as the State's total allocations for a particular year do not exceed the appropriate aggregate tons of emissions.

Over time, the allocation should shift from a fossil-based system to one which includes all energy sources, whether or not fossil-fuel generated. Such a system will provide an additional economic incentive for generation which does not emit NOx, such as nuclear, hydroelectric, and renewable sources.

Emission Allocation Numbers

EPA's corrected emission allocation numbers are more acute then those projected for the 2007 baseline under the original proposal. These numbers include sources inadvertently omitted from the original inventory, including NU sources. Further, these numbers reflect a growth in the amount of generation in New England, especially in Connecticut. This is consistent with NU's projections for this area.

Trading Program

EPA has done a good job minimizing the difference between its proposed trading program and that already approve by the Ozone Transport Commission (OTC). In this light, NU supports EPA's proposal to include sources over 250 mm/BTU/hr or over 25 megawatts with States reserving the right to also include as "core" sources, up over 15 megawatts.

EPA has requested comment on the inclusion of addition types of sources. States should have the right to add additional sources including municipal waste combusters, internal combustion engines, kilns, calciners, and process heaters. Included such additional sources world give these States incentives to reduce emissions below regulatory limits. If such sources are included, the State allocation should be revised as necessary.

EPA has also requested comment on banking. The program should include a banking option to provide an incentive for covered sources to reduce emissions. Without it, reduction credits would be lost if not used in the year made.

Any concern banking would lead to a large number of allowances flooding the market and causing ozone exceedances in a particular year, can be addressed through flow control. To prevent allowances from being bankable under one program but worthless under the other, EPA's flow control should be identical to the one contained in the OTC NOx budget. Under such a system EPA would set a ratio of two to one for banked allowances whenever the percentage of banked allowances exceeded 10 percent of the trading program budget for that control period.

Finally, generators should be allowed to bank early reduction credits in order to encourage air quality improvements as soon as possible. By September 30, 2002, the beginning of actual implementation, States would determine how many early reduction credits had been created, and would be required to reduce their allocations by this amount. This would prevent use of early reduction credits from casual ozone exceedances.

Voluntary Inclusion of Other States

Utilities and large sources in States not covered by the rule should be allowed to opt into EPA's 110 trading program, provided they agree to adopt either the allocation formulae contained in the SIP call or the OTC's Phase III limits. These limits are comparable to those proposed for power generators and large industrial sources in the SIP call, so the reductions required would be similar. Additionally, allowing these sources to opt into the 110 trading program would allow for the seamless trading program discussed above. This issue is particularly relevant to Maine, New Hampshire and Vermont—the three northernmost States in the Ozone Transport Region. Excluding sources in these States from the trading provisions in the SIP call would lead to difficulties in maintaining a regional program.

Phase II NOx Exemption

EPA should retain the authority to relieve boilers subject to the cap-and-trade rule from the Phase II NOx limits, as proposed. This approach is consistent with the purposes of the CAAA and would allow utilities to take advantage of the cost savings that result from flexibility, within a cap, to trade allowances among utilities, as well as among boilers owned by a single utility.

However, the authority should only be exercised if compliance with the cap-and-trade program would achieve the same or greater overall NOx reductions in the same timeframe. This timing condition may be significant, in that NOx Phase II limits are effective in 2000, 3 years before implementation of the SIP call.

Timing of the Reductions

The Agency should hold to, or accelerate, its proposed implementation schedule of September 2002 for requiring actual reductions. In any event delaying implementation beyond September 2002 would be inconsistent with the CAAA as well as highly inequitable. First, the CAAA requires NAAQS be achieved "as expeditiously as possible". The timeframe proposed is both economically and technologically feasible (States Report on Electric Utility Nitrogen Oxides Reduction Technology Options for Application by The Ozone Transport Assessment Group: April 11, 1996). Second, under EPA's current Rate of Progress requirements and the proposed SIP call, many downwind nonattainment States, like Connecticut, will have achieved from 36 percent to 42 percent reductions from 1990 baseline emissions, after accounting for all growth, before the upwind, significantly contributing States would begin to implement control measures in September 2002. Third, the September 2002 date aligns with the OTC MOU Phase 3 schedule, requiring compliance with the uniform emissions rate by the 2003 ozone season.

Although the rule requires that SIPs contain implementation of control measures no later than September 30, 2002 (40 CFR 51.121(e)(3)), other sections in the rule, and EPA's "Timeline for the Proposed Regional Ozone Transport Rulemaking" suggest a later date is possible. In particular, the rule requires that that SIPs provide for compliance with the NOx budget during each ozone season beginning in 2007. See 40 CFR 51.121(e)(2). Similarly, the rule and timeline state that each SIP revision must demonstrate that the State's measures, rules and regulations are adequate to provide for compliance during the 2007 ozone season. (40 CFR 51.121(g)(1)).

NU wishes to confirm that all control measures necessary to comply with NOx budgets will be fully applicable by September 30, 2002, and that the timeline would not in fact allow 5 more years for the States to comply. Additionally, if this is true, NU questions why States should have an additional 5 years to demonstrate compliance.

In conclusion, NU believes EPA's proposed rule represents an effective approach to addressing regional ozone transport and urges the agency to go forward with rule implementation as soon as possible. Thank you for the opportunity to comment. If you have any questions, please contact Mr. Charles F. Carlin, Principal Engineer (860–665–5344) or Mr. Richard A. Miller, Manager Environmental Regulatory Affairs (860–665–5480).

Very truly yours,

DENNIS E. WELCH, *Vice President for Environmental, Safety and Ethics, Northeast Utilities System.*

NORTHEAST UTILITIES SYSTEM,
March 9, 1998.

D12150

Air and Radiation Docket and Information Center,
Attention Docket No. A–96–56
U.S. Environmental Protection Agency,
Washington DC 20460.

REFERENCES: EPA PROPOSAL TO REDUCE REGIONAL TRANSPORT OF OZONE

DEAR SIR OR MADAM: The following comments on EPA's proposed rule are offered on behalf of the Northeast Utilities System (NU) companies, which include The Connecticut Light and Power Company, Holyoke Water Power Company, North Atlantic Energy Service Corporation, Northeast Nuclear Energy Company, Public Service Company of New Hampshire, and Western Massachusetts Electric Company.

NU companies constitute the largest electric system in New England serving 1.7 million customers. We currently participate in a variety of Clean Air initiatives including EPA's Green Lights programs, and actively participated in the Ozone Transport Smear Group (OTAG). In 1996 NU won an EPA Environmental Merit Award for installing Selective Catalytic Reduction at Merrimack Station in New Hampshire. NU has spent almost $40 million in the last 7 years to reduce fossil plant emissions and comply with the Clean Air Act Amendments (CAAA). With these substantial efforts, NU has a system-wide NOx emission rate which ranked tenth best among the 50 largest Eastern utilities, according to a 1996 NRDC Benchmarking "Air Emissions of Utility Electric Generators in the Eastern U.S."

NU believes that the proposal represents an effective approach to addressing regional ozone transport by achieving the necessary NOx emissions reductions from all source sectors across the 22 eastern States. Our comments address several areas, including NU efforts to reduce NOx, the severity of the transport problem, specific comments on EPA's proposal, and NU experiences in installing NOx controls on multiple units.

1. NU Background

Over the past decade NU power plants have implemented a variety of pollution controls, including water injection, overfire air, modified burners, low NOx burners, modified operation., and selective catalytic and non catalytic reduction outruns.

Further, since passage of the Clean Air Act, NU has improved air quality by adding the capability to burn additional natural gas and using low-sulfur fuels.

In addition to these direct efforts, NU has indirectly reduced pollution through substantial investments in customer conservation and energy-efficiency improvements. Specifically, NU companies have invested over $555 million since 1982 in a variety of programs, thereby avoiding air emissions from our power plants of approximately 20,800 tons of NOx. Further, nuclear operations on the NU system, from 1968 to the present, have enabled us to avoid emitting over 400.000 tons of NOx.

As part of the Ozone Transport Commission (OTC), NU's service territory States, Connecticut, Massachusetts, and New Hampshire, have committed to:

- by 1999, reducing ozone season major source NOx emissions by 65 percent (from 1990 levels) or emitting at a rate no greater than .20 ls. per million BTU (whichever is less stringent), and
- by 2003, reducing ozone season major source NOx emissions by 75 percent (from 1990 levels) or emitting NOx at a rate no greater than 0.15 lbs. per million BTU (whichever is less stringent).

NU will comply with these OTC requirements and any requirements imposed by the current EPA rulemaking.

2. Severity of the Transport Problem

On certain days, ambient ozone levels in each of the three States served by NU have exceeded the 1-hour ozone standard and would have exceeded the new 8-hour standard. These exceedannces occur despite very substantial and expensive reductions made by NU and other businesses over the past 25 years. Significant further local reductions are planned and will occur. However, stopping all anthropogenic emissions within these States will not attain the ozone air quality standards. Clearly, the influx of transported ozone and its precursors must be reduced to give all of the States a chance to provide healthy air for their citizens.

In addition to the negative health impacts of ozone, States in non-attainment suffer economic consequences. The cost of the added pollution controls and offsets made necessary by a States's non-attainment status are disproportionately borne by the

industries and residents within that State. Many existing sources in our region, including NU customers, have installed RACT for NOx or VOC, and new or modified sources are subject to BACT/LAER and offsets. Some sources recently have had to spend over $13,000 per ton to control ozone precursor emissions. In considering additional requirements for States such as Connecticut and Massachusetts, EPA must recognize that these States have already made considerable expenditures. In contrast, sources in upwind States, which significantly contribute to non-attainment in NU's service territory, but which are themselves located in attainment areas, have avoided such costs to date. This inequity exists because the costs of downwind pollution are not captured in the costs of operating upwind sources. Imposing equal control requirements across the SIP call region will internalize these environmental costs and level the playing field among regions.

The contribution of Midwest and Southern emissions is substantial and is likely to grow with electric utility restructuring and open competition. According to OTAG modeling, on high ozone days, 40 percent of the ozone in Eastern States is transported from Midwestern and Southern States. In 1996, the Federal Energy Regulatory Commission predicted that increased production of low-cost power in the Midwest and South might lead to NOx emission increases of over 500,000 tons per year. This prediction seems now to be coming true. According to a recently issued NESCAUM report, between 1995 and 1996 (when the Federal government opened up access to interstate transmission lines for wholesale competition), one Midwestern company alone, American Electric Power, increased emissions of NOx from coal-fired plants by over 51,000 tons (See "Air Pollution Impacts of Increased Deregulation in the Electric Power Industry: An Initial Analysis," January 15, 1998). This figure is significantly greater that the total 1996 NOx emissions from all NU sources, 31,964 tons.

3. Specific Comments

The NOx reductions proposed by EPA are necessary for environmental protection, justified by modeling, and fully supported by law. The reductions will also have the ancillary benefits of reducing, regional haze, acid deposition, and eutrophication of water bodies such as Long Island Sound and Chesapeake Bay. Based on our experience with similar controls, the reductions are also technically and economically feasible. Specific comments below address the following: cap and trade, OTAG's recommendations, growth in utility production, timing of reductions, sanctions, transitional SIP issues, and mobile sector emissions.

A. Cap And Trade

The importance of capping regional NOx emissions cannot be overstated. The NO caps EPA proposes, however sweeping, are necessary to produce the ozone transport reductions needed to come into compliance with the CAAA. NU endorses the use of this system, rather than a "command and control" method to obtain reductions.

Use of a cap and trade system is especially important in our industry. As we restructure, the utility industry is entering a period of uncertainty, particularly with respect to future use of generating units. It is critical that this operating uncertainty does not create uncertainty in the environmental benefits of EPA's rulemaking.

The availability of an emission trading mechanism will provide flexibility to ensure cost-effective and timely compliance with EPA's proposal. Emission trading is proven means of reducing the total societal cost of a reduction program. One look no further than the Acid Rain Program to find an effective and workable system.

B. OTAG Recommendations

EPA's proposed rulemaking accurately and fairly reflects OTAG's recommendations.

The results of OTAG modeling, air quality analysis and State attainment modeling have proven:

- The existence of widespread transport of ozone precursors over the Eastern United States.
- The persistence of a summertime reservoir of elevated ozone levels throughout upwind areas such the Ohio River Valley which are carried by prevailing winds to the OTR;
- The existence of elevated ozone levels at the boundaries of the OTR often as high as 80 percent of the 1-hour NAAQS and sometimes actually exceeding the standard,
- The achievability of NOx controls on utilities of up to 85 percent reductions from the proposed 2007 baseline.

C. Growth in Utility Production

The Agency has accounted for expected growth to 2007 in setting the State-level caps. This is an appropriate approach and should allay State concerns that EPA's NOx budget might restrict future economic growth. However, the actual growth factors that EPA projects for some of the smaller States are questionable.

Growth in utility production was projected using the IPM model. This model does a good job on a large scale, but, as indicated by EPA's State-to-State breakdown, can give some questionable results. For example, the IPM model forecasts a growth of 22 percent for Connecticut, compared to 71 percent for Connecticut's neighbor, Massachusetts. NU expects generation to be built in New England, but cannot predict where exactly within the region, it will be sited. To account for this uncertainty, NU suggests that EPA use region-wide IPM numbers—perhaps based on the regional categories used by North American Electrical Reliability Council.

D. Timing of the Reductions

The Agency should hold to its proposed date of September 2002 for utility reductions. This would align the implementation with Phase III of the OTCs NOx agreement, and simplify the process for these affected OTC States. Implementation any later than this date will only allow pollution levels in affected States to continue to be unhealthy and cause these States to remain in non-attainment.

Delaying implementation beyond 2002 would be inconsistent with the CAA as well as highly inequitable. First, the CAA requires NAAQS be achieved "as expeditiously as possible"—not whenever implementation is politically feasible. Second, under EPA's current Rate of Progress requirements and the proposed SIP call, many downwind nonattainment States, like Massachusetts and Connecticut, will have achieved from 36 percent to 42 percent reductions from 1990 baseline emissions accounting for all growth), before the upwind, significantly contributing States first begin to implement control measures in 2002.

E. Sanctions

Because implementation of the reductions proposed will not occur until after the next (1999) milestone, EPA should not sanction Eastern States that cannot attain the standards because of significant contributions from upwind States. Specifically, EPA should not "bump up" such States, including Connecticut, Massachusetts, and New Hampshire, for failure to demonstrate attainment in "serious" nonattainment areas. Similarly, for these States, EPA should not require that offset ratios be increased for new construction and should not cutoff Federal highway funds or grants to State air programs. Finally, EPA should not require States affected by significant contribution from upwind States to make demonstrations of attainment and reasonable further progress (RFP) until after implementation of this proposal. Demonstration of attainment is impossible until upwind reductions are made, and imposing RFP reductions is inequitable until upwind States make comparable reductions.

F. Transitional SIP Issues

Although not part of the ozone transport proposal, EPA has recently issued a "Concept Paper" on implementing the New Source Review program in transitional and other areas, that relates in important ways to EPA's Section 110 proposal.

Unfortunately, this Concept Paper would undermine many of the benefits of this Section 110 proposal. For instance, the paper proposes to allow States to designate reductions from the implementation of regional ozone control measures to be placed in an "offset pool" which could then be used by new sources. Reductions should not be displaced by the construction of new sources, except to the extent that the reductions are surplus and go beyond the regional control obligations.

Further, the Concept Paper would allow sources in transitional areas to satisfy BACT rather than LAER. This is inequitable, as sources in other non-attainment States must meet LAER. Further, the Concept Paper suggests that the NOx threshold for BACT would be 100 tons in transitional areas, significantly higher than the 40/25 ton threshold in non-attainment areas.

It questionable whether EPA has authority to make such concessions to any State, and unfair to give such concessions to only certain States. If indeed, EPA has authority to make such concessions, it should grant them to all States in non-attainment. OTC States, such Connecticut, Massachusetts and New Hampshire, which have expended millions of dollars in improving air quality, and warrant such concessions more than do new non-attainment States which have not made any progress to date.

G. Mobile Sector Emissions

EPA must require reductions from all source sectors commensurate with their contribution. Nationally, in 1995, the mobile sector contributed 48.7 percent to NOx

emissions (National Air Quality Emissions Trends Report, 1995). However, the proposal would not mandate any State controls on mobile sources (though it assumes large reductions will be obtained through existing SIP measures and federally required programs). Even assuming the Federal reductions hoped for from the mobile sector, this sector will grow and will constitute a larger piece of the NOx pie totally. For example, if the reductions proposed in this rule are implemented, in Connecticut in 2007, mobile emissions would be eight times utility sector emissions. Accordingly, EPA must compel further reductions from the mobile sector.

4. NU Experience with NOx Controls

Proposed requirements are reasonable, based on similar NOx controls installed at NU-installed various types of NOx controls on its fossil fuel units in 1993–95. These controls were required by RACT regulations in the three States in which we operate. The units, controls, effectiveness, and costs are listed in the attached table.

At the start of our effort, we were concerned that NOx controls would be technically difficult and extremely expensive. We began with an exhaustive program to identify feasible control options for each of our units, and found that reductions were not only achievable but also less expensive than first thought. As the table shows, we installed a wide range of NOx controls from simple combustion modifications to selective catalytic reduction. We have operated with these controls for approximately 3 years, and have seen little if my impact on unit availability.

It is important to note that all of our controls were installed concurrently, and at a time when many other units in the Ozone Transport Region were also installing controls. We were able to manage this program without exhausting the vendor supply, and without an impact on system reliability. Most of the work was done during previously scheduled maintenance outages, which in some cases had to be extended slightly.

Thank you for the opportunity to comment. If you have any questions, please contact Mr. Charles F. Carlin, Principal Engineer (865–665–5433), Mr. Richard H. Pershan, Environmental Analyst, (860–665–5296), or me.

Very truly yours,

RICHARD A. MILLER, *Manager, Environmental Affairs, Northeast Utilities System.*

NORTHEAST UTILITIES SYSTEM,
March 19, 1996.

D09723

MR. PETER TSIRIGOTIS
Air Docket Section (A–131)
Attention Docket No. A–95–28
U.S. Environmental Protection Agency,
Washington, DC 20460.

DEAR MR. TSIRIGOTIS: Northeast Utilities Service Company (NUSCO), as agent for Public Service Company of New Hampshire (PSNH), Holyoke Water Power Company (HWP). Western Massachusetts Electric Company (WMECO) and The Connecticut Light and Power Company (CL&C), is pleased to offer the following comments on EPA's proposed NOx emission limits under Title IV of the Clean Air Act Amendments (CAAA). We are encouraged that this proposal from the EPA is requiring further controls on major emitters, and very much agree with the Agency's approach of setting emission rate targets rather than specifying a particular technology such as low-NOx burners. This allows companies to determine the most economic controls for their specific units. On balance, the proposed rule is a reasonable one and should be adopted.

Our comments comprise three major points:

A. Based on our experience with installing NOx controls, the omission limits you have proposed are reasonable and attainable.

B. Since this rule is not aimed at attaining the ozone standard under Title I of the CAAA, it should not be used a substitute for NOx control recommendations currently emanating from the Ozone Transport Assessment Group (OTAG) process.

C. There are significant secondary benefits to be gained from controlling NOx emissions beyond reductions in acid rain, ozone and ozone transported to upwind States.

Additionally, we suggest some potential improvements that may make the rule easier to implement.

A. NUSCO operates six coal units that will be covered by the proposed rule. Each is already attaining State limits similar to the limits EPA has proposed, utilizing NOx controls that were installed under State rules for NOx RACT required by Title I of the CAAA. In 1990 and 1991, we were concerned about the expense and difficulty of installing these controls. However, we found that the installations were substantially less costly than we had thought. We currently are operating a Selective Catalytic Reduction (SCR) unit on Merrimack 2, a Selective Non-Catalytic Reduction (SNCR) unit on Merrimack 1, a Low NOx Burner/Over Fire Air (LNB/OFA) system on Mt. Tom, and combustion modifications with OFA on three units at Schiller Station. Cost information on each installation is shown on the attached table, as explained in the table "Notes" these numbers are estimated. Our estimated control cost ranged from $141 per ton at Schiller (Combustion Modifications/OFA) to $603 per ton at Merrimack 1 (SNCR). All of our control costs are well within the range that EPA cites in the preamble of its proposal, and are generally at the low end of the range.

B. It is important to keep in mind that NOx emissions limits proposed here for coal fired power plants do not address attainment of the ozone standard. While the resulting reductions will move in the direction of attainment, they do not go far enough to reach these goals. The Title IV reductions should not be the only regional NOx reduction program, it is realized by those of us living and working in the Northeast that a more comprehensive NOx/ozone program is required.

C. There are secondary benefits (beyond reducing acid deposition) to lowering NOx emissions from coal fired power plants. Concern over ambient concentrations of the particulate is heightening, and airborne nitrate is a large potion of the total concentration. Airborne nitrate also contributes to degradation in visibility. Additionally, there is mounting evidence that NOx emissions contribute to nutrient loading in water bodies such as Chesapeake Bay and Long Island Sound.

We are grateful to have this opportunity to comment on this issue and trust these thoughts are considered in making the final ruling. Please call Mr. Charles F. Carlin, Principal Engineer, at (860) 665–5344 to discuss this further or if you would like additional information.

Very truly yours,

R.G. CHEVALIER.

Senator LIEBERMAN. Thank you.

I am going to read just briefly from it. I want to make clear that this was March 19, 1996, but I believe the data is still relevant. It was a submission to EPA.

But interestingly, Northeast points out that it operates six coal units that will be covered by the proposed rule. It says that "each is already attaining State limits similar to the limits EPA has proposed, using NOx controls that were installed under State rules." Then the writer of the letter says, "We were concerned about the expense and difficulty of installing these controls; however, we found that the installations were substantially less costly than we had thought." I'm jumping ahead here—they do include cost information and the tables, that will now be a part of the record.

The concluding sentence reads, "Our estimated control costs range from $141 per ton at Shiller," which is the location of one of the coal-fired plants, "to $603 per ton at Merrimac."

The final sentence, "All of our control costs are well within the range that EPA cites in the preamble of its proposal, and are generally at the low end of the range."

So that's just the experience of one utility company, to add to the mix of data that we've received.

Senator Treat, let me begin with you and ask you this. I understand that emissions of NOx have actually increased 1 percent nationally between 1990 and 1997, but that in Maine you have actually cut NOx emissions by nearly 14 percent. Presuming that it's true, how have you done it?

Senator TREAT. Well, we've done it by putting additional controls on our power plants and facilities. We have done it by moving to

cleaner fuels. We have done it by adopting the California Low Emission Vehicle standards, way in advance of what the Federal Government is going to do. We are going to have cars on the road that are going to meet the Federal standards 10 years earlier than that.

So I think that it's a multifaceted strategy. It has been difficult politically to get it through, but we know we have to do it. We also know we have to do it if we're going to be asking folks in the midwest and other parts of the country to help out, as well.

Senator LIEBERMAN. Do I understand correctly that even with all that you have done, as you described—and done with some success, especially with the 14 percent reduction—it is still hard for Maine to achieve the national standards without a regional control strategy?

Senator TREAT. Yes, it is. I believe we're currently in attainment right now, but we could move out of it with a single exceedance in the area at issue. So we're right on the edge right now. We've already had some of the earliest exceedances that I've ever known; on that same Memorial Day I was kayaking and having a hell of a time with my own breathing, and was not surprised to find out that that was a day when we had very high levels of ozone in our State.

Senator LIEBERMAN. Right. Thanks.

Commissioner Hill, you have talked about some of the air quality problems in the greater Atlanta region, and I looked at some of the EPA tracking of data from your area. An ozone monitor in Gwinnett County revealed 27 days during 1998 in which ozone levels significantly exceeded the ozone health standards, and a monitoring site in neighboring Rockdale County actually saw more than a month of bad air days.

No court as yet has challenged the legitimacy of the 8-hour standard as a measure of public health protection. The disputes, as you know, are over the level to set, the threshold.

I presume from your opening statement that those exceedances concern you as a public health issue for your region, and I just wanted to invite you to talk a little bit, not only from the regional point of view but your local point of view, how you think you can clean up the air.

Mr. HILL. The exceedances that you were talking about on the 8-hour standards were high. We are controlled so much by temperature and humidity in the Atlanta area. Let me give you an example. I was in Harold Reheis' office, who is head of EPD. One day we were standing there talking, and he said, "Wayne, right there is the problem." I said, "What?" He said, "The trees. All the pine trees we have put off certain things that cause ozone." I said, "Certainly you're not telling me we need to cut all the trees." He said, "No, but if we lived in an area with no trees, we wouldn't have the problem we have today."

So we are hampered not only by the things that are being done. When you look at the station in Gwinnett County, I think we are one of the stations that don't exceed it as much as some of the other areas. Now, the 8-hour standards, I don't believe there's any way that we are ever going to meet those, simply because of the natural hindrances that we have that deal with those.

Now, we do have a plan that we're bringing forward that will bring us into conformity with the standards that we have today, but it's going to be 2003 before we get there. It deals with power companies and it deals with vehicles, and if you'll look at the vehicles, they are not as big a part as they have been. With the growth that we've had in our area, I think we've done great.

I fly a small plane. I don't see the dirty air like I did in the 1970's. We have actually done a good job in the Atlanta region. Now, at the county level we have a lot of people who say, "Quit building roads, and you won't have any more cars." That will not solve our problems. We're actually creating more, and that's part of what I was touching on. When we have road projects that are stopped and we cause more congestion, we're actually hurting matters. So we're fighting a losing battle sometimes.

Senator LIEBERMAN. You know, I wanted to talk to you about your call for consistent guidelines in order to plan for activities like roadbuilding.

My understanding was that the State Implementation Plans were really intended for the exact purpose of preserving State flexibility, and that they assume a multi-year budget of allowable emissions and give the States the opportunity, while they are trying to reach attainment of the Clean Air Act goals, to make some choices about what they want to do at what times. That's what I wanted to ask you, what you think about the NOx SIP Call Rules in the sense that they preserve flexibility, I believe, for some of the transportation sector decisions that you've talked about. Of course, we face that in Connecticut all the time ourselves.

Mr. HILL. We have an air quality group that meets, and we were sitting in a meeting the other day. One group was interpreting the rule one way and one another way. We've got to find a way to get these groups together if we're ever going to solve problems. That's what I was referring to there. This particular issue dealt with how they model something. One group was modeling one way and one another, and we couldn't bring the two points together. So that's one of the issues when I say "consistency." If it was interpreted the same way, or somebody had the power to do that, it would make it easier.

Flexibility is great, but if you can't meet the 1-hour standards, I'm not sure you're ever going to meet the 8-hour standards.

Senator LIEBERMAN. Thanks, Commissioner.

May I take advantage of the Chairman's generosity and just ask a quick question of Mayor Nye?

I find in Connecticut—and I bet that you find in Georgia, Commissioner, and you do in Ohio, and my friend and colleague from Ohio said it; he's an environmentalist—that these things matter to people, our constituents, particularly when they connect it to their health. Looking over some of those same EPA monitoring and tracking numbers, 26 counties in Ohio don't meet the 8-hour standard. Under the SIP Plan, all but one of them would be brought into attainment.

Doesn't that make it in the interest of your area to be supportive of this NOx SIP Call?

Mayor Nye. I think that's a very good question and a very fair question. Certainly, as Mayor, I hear the complaints of the citizens.

I go to the barber shop and people pick my brain. I can't go out to dinner without people coming up to me saying, "I hate to interrupt your dinner, but"—so I hear all those kinds of comments.

That is one of the reasons that in Hamilton, we have taken very proactive steps. Senator Voinovich mentioned our hydroelectric plant on the Ohio River. We did that in 1981, voluntarily. We spent almost $30 million more by building a hydroelectric plant than we would have for a coal-fired plant. We chose that; we chose to do that. We are also doing various other environmentally friendly things now, and I think that's one of our concerns. We feel that we are being penalized by this because we did so many of these things in advance, and now we are going to be asked to reduce our NOx emissions by 85 percent. Simply by going to the green power that we did, we reduced our NOx by 50 percent right out of the gates. We don't feel that we should voluntarily reduce it by 50 percent, and then be asked to reduce it by 85 percent more. That's very onerous.

The other issue in that regard is, during the baseline years of 1995 through 1997, we were upgrading Boiler No. 9, which I referenced, to be more environmentally friendly—again, voluntarily. Those were the baseline years that were used, and we weren't using our Boiler No. 9. Again, we feel that we are being penalized because those were abnormal years.

Certainly, to the credit of the EPA—I have been to EPA and they have listened to our concerns. They are reviewing them right now, and we certainly hope that they will take those unusual circumstances into account.

Senator LIEBERMAN. OK. In some ways we all have common interests here. I wish we could work out a system where we weren't in apparent conflict, in spite of our common interests.

I would say finally that on the question of constituents coming up to you while you are out, last year I was out for dinner with some friends and people kept coming up and asking questions. Finally one of the people that was there with me said, "Boy, this is a real nuisance. People keep bothering you while you are out here for dinner." I said, "One thing that would be worse would be if nobody came up to say hello."

[Laughter.]

Mayor Nye. Amen.

Senator LIEBERMAN. Thank you.

Mayor Nye. Senator, if I could follow up on that—being Mayor, I would like to pipe up here. You talked about common ground, and I think Senator Treat talked about why the States can't do this themselves. I think then-Governor Voinovich's National Governors' Association alternative is the exact type of program that we need to look at. I think it was a very reasonable approach. It addressed the concerns of the environment, but it also did it in a cost-effective manner. The Governors got together, with Governor Voinovich's admirable leadership. I think we need to look at that long and hard. I think that could mitigate much of the trouble that we're having right now.

Senator INHOFE. I think that probably answered Senator Voinovich's first question.

[Laughter.]

Senator VOINOVICH. Well, it's interesting, depending on where you're at and your perspective on this.

First of all, Senator Treat, I would like to congratulate you for the steps that your State has taken to try to solve your own problem. I would like to pint out that while I was Governor of Ohio, we doubled the budget of the EPA. When I came in as Governor, 26 regions of the State weren't attaining the 1-hour ozone standard, and when I left, all of them but one had been approved, and we are waiting for a rule from EPA for that one area right now. In 1997, I vetoed legislation to remove Ohio's emission testing program, which we put in in 1996. So I know a little bit about the heat that one takes in moving forward with environmental policy.

I would also like to point out that up through 1995, our utilities spent $3.7 billion, which at that time was more than all of the northeastern States put together had spent on investing in their power plants.

Last but not least, we have, Senator Lieberman, come up with a plan to deal with the new 8-hour standard that the court just said wasn't reasonable. As Mayor Nye has mentioned, we think it's a reasonable approach to deal with the problem.

I think the issue now, with this court business going on, is whether there is a possibility in terms of the 126 petitions that were filed to work something out so that we can move forward with this, or is this going to be hung up in court for the next 2 or 3 years, which in my opinion doesn't do anything for the environment?

So that's the real issue here: can we work together, through the EPA, to come up with something that is reasonable?

I would also like to point out one other thing, because I spent a lot of time on this issue. Back in 1997—I don't know whether you're familiar with this or not—there was a memo from the Commissioner of Maine's Department of Environmental Protection to Governor King, and it stated that "the auto and utility emissions from Massachusetts and New Hampshire have the greatest impact on Maine air quality." In addition, the memo acknowledges that the New England States—well, I'm not going to get into the issue of the 126 petition.

But the fact of the matter is that—you know, we could shut down all our power plants; and, Senator Lieberman, I don't think that your State would be reaching the 1-hour ozone standard. I think that we all ought to get together and try to work at coming up with a solution that is reasonable, and move forward. I think that, to me, would be the most important thing, Mr. Chairman, that could come out of this hearing. This other thing is going to be hung up and we don't know what we're going to do about the 8-hour and the particulate and so on.

But there is a sense of cooperation here, of moving forward, by the midwest States and the Governors, and I think that it would behoove all of us to maybe get the OTAG group together again and talk about moving forward while all of this court thing is going on.

Senator TREAT. Did you want a response or a comment on that?

Senator VOINOVICH. Yes.

Senator TREAT. Thank you.

I have a real concern that I'm not sure that we have any standard right now. In my testimony it was "this standard, that standard" being violated. They are; it's not clear that we have a Federal standard. So certainly we need to be thinking about what's going on right now.

But as to the question of ozone coming from Ohio, and whether it is reaching Maine or not, obviously it is not flying over all those other States and landing in Maine, causing all of our problems. But it is reaching States to the south of Maine, and those States are going over the standard, and a slug of air is coming up from them. How much of that is attributable to Ohio or some other State? Most of it certainly is coming from the States directly south of us, but we would not be getting that pollution from them but for the fact that they're getting a great deal of the ozone from outside their own borders.

So it is a complicated scientific thing, but certainly it has been recognized that at least 500 miles worth of ozone transport is justifiable, and that goes a long way outside of our own borders, if you're starting from the south of the State.

Senator VOINOVICH. Well, it's interesting that the SIP Call in your own region—you agreed to 75 percent, and yet the EPA is setting 85 percent for the midwest, and you just wonder about that.

I think OTAG has also shown that most transport impacts occur within 150 miles of the source. The 126 petition seeks controls over 600 miles away.

So I just thing that we get into a lot of this technicality. The main thing is, how do we work together to have a cleaner environment and do more for public health than we're now doing? There's no question that we've had exceedances in Ohio; we had them all over the country when the hot weather came in. We had the same thing—don't use your lawnmower, stay inside, and the rest of it. But that happens around the country. How do we all, as a country, work together to see if we can't do something about that, and at the same time understand that it has to be reasonable and meet good science and good cost-benefit analysis?

Senator INHOFE. Well, let's just briefly have another short round here. Something that Senator Voinovich said sparked an interest in me, having been a Mayor and having also been in the State legislature, so I understand how these things work.

How is all this affecting your planning? You have a situation where the EPA has issued a stay, but they're going forward with Section 126; of course, that would just be on the 1-hour. If they should win their appeal, then it's going to be on the 8-hour? How do you anticipate this? Because you can't just wake up one morning and say, "All right, now we're going to implement this." Are you having problems? Isn't it a little bit confused right now, Senator Treat?

Senator TREAT. Well, it is confused. I think one thing of interest here is that for some States, the old 1-hour standard was actually harder to meet than the new 8-hour standard. So it's not so clear that going back to the old standard is going to help everybody out in terms of meeting those standards. It really depends on the State and where they are and the weather patterns and all of these things.

So it is an unclear thing. I think we need to, at least initially, make sure that there is some kind of standard out there, because this is a matter of public health. We just can't wait around for 2 or 3 years with nothing in place.

So certainly it would be good to have some sort of rules out there for the time being. I don't have any problem with additional discussions amongst the States and with EPA. I think generally it is a benefit. We do think, though, that what EPA did overall made sense for us. You can talk about the timeframe for compliance, and I understand how hard that can be, especially on smaller businesses, but the fact is that many of the northeastern States have been asking for action to be taken for 10 or 20 years.

So for us, we see it as coming long after it perhaps should have. The upwind States, I can understand their perspective. It's a lot to swallow all at once. It is tough.

Senator INHOFE. Any comments on that? Commissioner Hill?

Mr. HILL. I'd like to change hats and get my ARC hat on. That's one of the things that we deal with when we're talking about planning. We are talking about planning; most of our plans for the region are laid out over a 20-year period. When we have these things continually changing, it's very hard to deal with them. The thing that we've been dealing with lately is, we have a standard; we have a 1-hour standard. The minute we make the 1-hour standard, it drops to the 8-hour standard, and it is very hard to plan. It's a very tedious thing. We're working very hard, but some of those things don't have answers yet.

Mayor Nye. I would agree with that. Right now Ohio is going through electric deregulation, which is also making our job very challenging. But to plan for something that may or may not occur is quite challenging.

If the EPA regulations go through as presented now, it could literally put us out of business. After being in the public power business for 110 years, we might have to close our doors. To try to plan for that eventuality, and then try to do the appropriate things, we can't plan ahead. We can't buy a project that would be paid for over 20 years if, in 2 or 3 years, we are going to be out of business.

Senator INHOFE. Senator Lieberman, do you have some further questions?

Senator LIEBERMAN. I have no further questions for this panel, thanks.

Senator INHOFE. All right.

Senator Voinovich?

Senator VOINOVICH. I have no more. Thanks very much.

Senator INHOFE. All right. Well, thank you very much.

Senator INHOFE. We will ask the second panel to come up to the witness table.

Panel II includes Mr. Russell Harding, Director, Michigan Department of Environmental Quality, and Ms. Jane Stahl, Deputy Commissioner of the Connecticut Department of Environmental Protection.

We will start with Ms. Stahl. You heard our instructions to the first panel; if you would try to keep your opening comments to 5 minutes, your entire statement will be submitted for the record.

STATEMENT OF JANE STAHL, DEPUTY COMMISSIONER FOR AIR, WATER AND WASTE PROGRAMS, CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION, HARTFORD, CONNECTICUT

Ms. STAHL. Thank you Mr. Chairman, members of the committee. I will use up a little bit of my time to thank Senator Lieberman not only for his support of many of our efforts in the Department of Environmental Protection——

Senator INHOFE. Your time in thanking Senator Lieberman will not be counted against you.

[Laughter.]

Ms. STAHL. Thank you so much.

Senator LIEBERMAN. Thank you, Mr. Chairman.

Ms. STAHL. I also suggest that he does such a good job that many of my comments can in fact be cut back, so thank you, sir.

Senator LIEBERMAN. I want to state for the record, Mr. Chairman, that this is a Republican State administration that Ms. Stahl is speaking on behalf of.

[Laughter.]

Ms. STAHL. Well, let me state that I believe I am speaking on behalf of all of the citizens of Connecticut.

I would like to start by highlighting the two points that I really do want to make here this morning, the first being that Connecticut and the other northeastern States cannot achieve our health-based air quality standards without actions by our sister States. The regional transport of air pollutants is real and harms all of our citizens.

The second point is that reduced air emissions are technologically achievable and economically feasible without compromising electric reliability. Those are lessons that, unfortunately, we learned the hard way in Connecticut, but they are in fact lessons well learned.

The State of Connecticut has been deeply involved in the search for a regional consensus-based solution to the problem of interstate transport of ozone. As a member of the Ozone Transport Commission, we have participated on the Ozone Transport Assessment Group from its inception, and fully support the development of market-based approaches to air quality management. We are disappointed by recent events that threaten the promise of cleaner air for all.

To inject a sense of immediacy into this discussion, I would like to point out—and I deviate from my comments here because in the past day we've had another exceedance, bring us to a total of nine exceedances of the 8-hour standard, and additional exceedances of the 1-hour standard. This is very early in the season for us to have had those impacts, and it looks to be a long, hot, dry haul for us based on weather patterns. So it's not getting better.

We in Connecticut have been engaged in a prolonged struggle to protect the public health of our citizens by bringing ground-level ozone concentrations down to levels which comply with the 1-hour ozone standard. We have taken great strides to control the primary pollutants that produce ozone by meeting, and often exceeding, the numerous requirements imposed by the Clean Air Act Amendments.

Despite our vast improvements in our air quality, we continue to remain noncompliant with 1-hour standards. The chief source of the continued noncompliance is the overwhelming transport of ozone and its precursors.

There are two maps attached to my testimony. Without going into great detail, and perhaps we can do that later, they do demonstrate the regional transport of ozone based on some significant monitoring and modeling throughout the years.

So we are at a distinct geographic disadvantage in achieving our reduced levels of ozone all on our own. We are also geographically blessed, but we will save that for another time.

Air quality monitoring data collected since the 1970's shows a significant contribution in the northeast originating from pollution sources outside the region. Transported ozone entering the northeast corridor has been measured aloft by aircraft at levels exceeding 80 percent of the 1-hour ozone standard, and over 100 percent of the unenforceable 8-hour standard.

The issue of interstate transport of ozone and its precursors has not gone unnoticed by Congress who, in structuring Sections 110 and 176(a) of the Clean Air Act, recognized that Constitutional limitations prevent individual States from addressing problems associated with interstate transport of air pollution.

In the absence of Federal leadership, Connecticut has reinstituted its 126 petition. We were hopeful of being able to do this kind of work in a more consensus-building atmosphere. We believed that the NOx SIP Call would allow us that regional approach and atmosphere, but still need to address the issue through whatever vehicles are available to us.

Regardless of the future of the NOx SIP Call, Connecticut suffers from some of the worst air quality in the Nation. We have sensitive subpopulations who are affected by environmental pollutants such as ozone. Compliance with the 1-hour standard will only minimize, not eliminate, adverse health effects because many sensitive subpopulations are being stressed by other environmental constraints.

Air quality modeling indicates that peak ozone levels will barely comply with the 1-hour standard in the year 2007, only if the NOx SIP Call as set forth in the NOx rule is fully implemented.

I see that the red light is on. I am hoping that during questions and answers we will be able to address some of the economic information and technological feasibility that has in fact been demonstrated.

I will stop here. Thank you.

Senator INHOFE. Mr. Harding?

STATEMENT OF RUSSELL J. HARDING, DIRECTOR, MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

Mr. HARDING. Thank you, Mr. Chairman and members of the committee. It is a distinct pleasure to be here this morning. My name is Russ Harding, Director of Michigan's Department of Environmental Quality.

I would like to start out by thanking Senator Voinovich for his leadership as Governor, and now Senator, in these clean air issues, particularly in the challenge of the 8-hour standard, on which we have prevailed in court.

Michigan has always been a leader in environmental protection. In fact, our air rules and regulations are much stricter than the Federal Government's. We have reduced emissions in our State by 75 percent in the last decade. Southeast Michigan is in attainment with the 1-hour standard, the largest industrialized area in the Nation to get that attainment status.

However, EPA has continuously placed roadblocks in the way of States and played fast and loose with Congressional mandates. We have been forced to seek relief through the courts. Our position has been vindicated; the 8-hour standard for low-level ozone, as you know, was declared unscientific. The NOx SIP Call, which required midwest and southeast States to impose expensive and unneeded controls to prevent transport of ozone, has been stayed indefinitely.

EPA's methodology for determining the culpability of States is significantly and scientifically flawed. EPA is defining "significant" by cost. We have repeatedly asked them, what is "significant"? We are more than willing to meet whatever our culpability is. They come back and define "significant" as what it costs for controls. That's ludicrous.

I convened a meeting last week of 11 State Environmental and Air Directors. I am not aware of a single State in the entire group that is unwilling to meet whatever our scientific culpability is in the northeast. This has not been a question of cost for us; it has been a question of doing the right thing, but doing the right thing that the science and technology require, not on a "one size fits all" mandate from Carol Browner. That mandate puts Alabama, Ohio, Michigan, everyone into the exact same prescriptive approach, which is not technically justified.

We have conducted extensive modeling in our State to find out exactly what our contribution was. We were very instrumental and worked hard in OTAG. I personally attended many of those meetings over several years. We learned a lot about the transport of ozone. Using those models, we know exactly what our culpability is and are willing to meet that, and so are other States.

Let me explain a little bit what our plan would do. Senator Voinovich, you touched on that earlier, and I appreciate that.

We took a very aggressive position. Six Governors signed on to a plan; many other States had a very similar plan. We brought that forward. It is an environmentally superior plan to the EPA NOx SIP Call. We agreed to an early down-payment to do 65 percent reductions. We further agreed to do all the fine-grid modeling necessary to meet any culpability we had, to even meet the new 8-hour standard, which the courts have set aside now. It was a very, very responsible position on the part of the States. We worked long and hard for a long time to get to that. We committed to that. We were not even given the opportunity to discuss that in any meaningful way with the agency; it was summarily rejected. They said, instead, "You're going to do it the way we want it done, and it's going to be done in a prescriptive manner and with the controls prescribed by us."

It was interesting, as I visited with States on this issue last week, every State has plans in the works to take care of their problems. Some are doing it different than others. For instance, North Carolina mentioned that they're going heavily at mobile sources.

They want enhanced I&M throughout their State. In the case of Michigan, we are going ahead with a rule, which we will have promulgated this fall, which does a 65 percent reduction in NOx. That will more than take care of culpability in the northeast, according to all the technical modeling. It will allow us to continue to meet clean air goals in our State. We have stepped forward to do that in the past and have achieved that. We are committed to that. We believe the citizens want that. It will also give us the opportunity for economic growth. We have worked closely with Dennis Archer, Mayor of Detroit, who has very much opposed these EPA rules and mandates without the kind of flexibility—and one thing that people often forget, on the NOx SIP Call, is that it imposed a budget cap and restriction on NOx on all of the States. Given that, it would be impossible to redevelop Detroit, impossible to continue to make progress on our brownfield sites that we have made to turn those back into a world-class city.

What can Congress do? Quickly, there are several things that I would like to ask you to do. Again, I believe that Carol Browner has built a house of cards of unreasonable politics and bad science. That house of cards is falling, thanks to the courts.

We do need some adult supervision at EPA. I believe that Congress needs to rein in the agency. It is clearly exceeding its Congressional authority. We need to heal the breach in regulatory ethics. Carol Browner has been in an advocacy role to the northeast States; she should be in an adjudicatory role. These petitions, for instance the 126 petition, should be looked at independently and not in an advocacy role.

I think that a good faith effort—and I heard what can be done—a good faith effort right now would be for USEPA not to promulgate a rule on the 126 petitions, but instead meet with both the northeastern, midwestern, and southern States involved in this issue so that we can come up with a plan to address clean air in this Nation. We are more than ready and willing to work on that, as we have been for several years.

In summary—I see my time is up—we appreciate your interest on this and look forward to working with you in the future.

Thank you.

Senator INHOFE. Thank you, Mr. Harding.

We have an interesting panel up here in that we have an eastern State and a midwestern State, and then a southwestern State. While it might be said that I don't have a dog in this fight, I think we all want the same thing, and that's clean air. We look at the whole Nation, not just our individual areas.

There is a meeting that is going to be called where we will have to leave at 20 minutes before the hour, so I am going to go ahead and defer to my two colleagues.

Senator Lieberman?

Senator LIEBERMAN. Thanks, Mr. Chairman. I will be brief.

Ms. Stahl, thanks for your testimony and your kind words.

Just to make the point quickly, am I right that Connecticut's ozone levels would exceed the National Ambient Air Quality Standards even if all manmade emissions were eliminated by Connecticut?

Ms. STAHL. That is in fact what our monitoring and modeling have shown us. Of course, if Senator Voinovich would like, perhaps we can model what would happen if those midwestern plants that he referred to earlier did in fact shut down, but that wasn't on our plate at the time. I hope he takes that in the humor in which it was offered.

Senator VOINOVICH. I do.

[Laughter.]

Senator LIEBERMAN. That's New England humor, you know.

Senator INHOFE. You mean like adult supervision?

[Laughter.]

Ms. STAHL. But in fact, our monitoring has indicated and identified for us the fact that transport is a major cause—I'm not going to use the term "significant" here—but is a major, major cause of the ozone situation in Connecticut. We have monitors that have no sources anywhere in the vicinity, and yet they are tripped during certain wind patterns, clearly identifying both the direction of the transport and the extent of the transport's impetus. It is information like that on which we rely when we make statements like "shutting down all of the manmade sources in Connecticut," but still not allowing us to achieve our goals.

Senator LIEBERMAN. Yes. I know from the statistics that while the national numbers on emissions of volatile organic compounds have dropped 8 percent between 1990 and 1997, in Connecticut we have reduced them by 19 percent. The NOx emissions have increased, as I mentioned to the last panel, by 1 percent over that period, but we in Connecticut have cut them by 8 percent—not quite to Maine's standards, but a pretty good result. So that's part of the conflict.

Let me just finally try to engage you and Mr. Harding in the discussion we have been having this morning.

I hear what you have said. The State of Michigan has been taking steps to try to reduce NOx. Part of the problem is that it is such a large problem. The numbers that I have seen say that utilities in the south and midwest emit four and a half times more NOx than the northeastern utilities. One utility source in Michigan, Belle River in St. Claire County, emits almost six times more NOx than all of the electric utilities in Connecticut.

The question is how to reconcile the numbers with the effort and come to a reasonable point. From our point of view, as you can imagine, Mr. Harding, we just think that what is happening is unfair. While I acknowledge, certainly, that you're making an effort, we feel we need more of an effort in light of all that we're doing—Maine, Connecticut, the other northeastern States, New York, New Jersey—to try to clean up, and still we're frustrated in that.

Maybe I will start, Ms. Stahl, by asking you if you are able at this point to answer the question about—not only about what Michigan is doing not being enough, but more directly, if you had a chance to review some of the southeast and midwest proposals, the alternate proposals at this point, and proposals from the upwind States, why Connecticut feels those are not enough.

Ms. STAHL. Again, I have to rely largely on the monitoring and modeling that we've done. We do recognize, and Mr. Harding and

I have agreed on as many points as we have disagreed on over time in our roles in the States.

This is one where our modeling shows us that regardless of what or how many more controls we institute in Connecticut or in the northeast, that unless the full reductions called for in the SIP Call as it is currently configured are effectuated, we will still not reach our health-based standards.

So it is very cut and dried in terms of the modeling. So that's one answer.

The other answer is that this is in fact a national problem, and because there are some—forgive me, and take it in the manner in which it is given—there are cost-effective solutions available to the midwestern States that are no longer available in the northeastern States. We have already grabbed that "low-hanging fruit," if you will. Again, not to say that Michigan and other States have not done anything, but there is still available to them significant reductions at lower costs than there are available at similar costs in the northeast. So there is some amount of just contribution. There is a contribution to our problem; we are hopeful that there will be a contribution to our solution.

The final point that I would make is that we will continue to institute new requirements in the State of Connecticut, but what we are hoping is that with some support from the midwest region, our efforts will not be used to offset the transport of additional pollutants, but in fact to further improve air quality.

Senator LIEBERMAN. Thanks. In light of the time, maybe you want to wait and respond to Senator Voinovich's questions.

Senator VOINOVICH. Well, I think I would have asked Mr. Harding to respond to that as well.

Senator LIEBERMAN. The question is, we are acknowledging that you are taking steps which are clearly constructive and in the right direction—I would ask it real personally—why should they be enough for us, who are still feeling that we are in a dangerous health situation?

Mr. HARDING. Well, a couple of things. First of all, one of the basic tenets of the Clean Air Act has always been that the Federal Government sets the standards, and the States are left with trying to figure our how to meet that. This NOx SIP Call absolutely turns that upside down, and that's one of the things that is so objectionable to the States.

I have visited extensively with the States on this issue. There are a lot of different strategies being employed for a lot of different good reasons. Atlanta, Georgia is not the same as Lansing, Michigan.

To give you an example of our problem with this, in saying that the 85 percent level requirements are necessary to fix this problem with utilities—and by the way, we don't think that's going to fix the problem, we're convinced of that—EPA actually did zero out all emissions from the midwest and the south to use that. Now, that is not even realistic.

Again I would say to you, Senator, the way to fix this problem in my opinion would be to develop the scientific and technical principles that we all would agree that we would apply across the board, and then the States agree to make the necessary reductions

to the extent that we are culpable in each State. That's going to vary; it's not going to be the same in Alabama as it is in Ohio and Michigan. I think if we could agree to those kind of principles—and I can't speak for all the States, but I haven't heard any State in the midwest or the south step forward and say they would not be willing to put in whatever controls are necessary in our States to help out the northeast. We've always agreed to that.

In the case of Michigan, we might use a different strategy than Ohio would use or Alabama or North Carolina. We would be willing to meet that, but we need to do it based on what the science and technology say, not on the whim of EPA that one size fits all. In fact, my technical staff tells me that they are convinced that this 85 percent across-the-board reduction on utilities is not the right strategy, and Michigan is not going to achieve the desired results.

So again, I don't think this debate is about how much it costs. Cost is not the point. We need to be worried about that; we always want to do things cost-effectively, but the point is we need to do them with some common sense and we need to do them based on sound technical principles. I believe the States are willing to step up and do those. I know we are in Michigan, and I think that's the way to resolve this.

Any help that Congress can give us to ask the agency to do that in good faith, we would certainly appreciate that.

Senator INHOFE. Senator Voinovich?

Senator VOINOVICH. Mr. Chairman, first of all, I would like to ask that the statement from the Director of the Ohio Environmental Protection Agency, who couldn't be here this morning, be inserted in the record.

Senator INHOFE. Without objection.

[The referenced statement follows:]

STATEMENT OF CHRISTOPHER JONES, OHIO ENVIRONMENTAL PROTECTION AGENCY

I am Christopher Jones, director of the Ohio Environmental Protection Agency. I want to thank Senator Inhofe and the committee for holding this hearing, and for inviting Ohio's testimony.

As you may know, Ohio is one of eight States which appealed the NOx SIP call. One of our primary reasons for doing so is that we believe the 85 percent reduction in utility emissions required in the rule is neither within U.S. EPA's authority to mandate nor justified by scientific data.

The Clean Air Act gives U.S. EPA the authority to establish national ambient air quality standards, but it reserves for the States the authority to develop their own control strategies that will achieve the standards. For U.S. EPA to effectively mandate in the SIP call the specific sources that must be controlled and the degree to which they must be controlled is a clear infringement on the States' rights. This is particularly egregious because the NOx SIP call is not based on sound science. In fact, it largely ignores the work of the Ozone Transport Assessment Group—OTAG.

In 1996, 37 States in the eastern United States formed OTAG to analyze persistent ozone problems east of the Mississippi River. After 2 years of study, including extensive modeling, OTAG presented a series of findings and recommendations to U.S. EPA. Some of the more pertinent findings include:

1. Regional NOx controls are effective in producing ozone benefits.
2. Ozone benefits diminish with distance, particularly at distances over 150 miles.
3. The following NOx controls would be effective in reducing ozone:

A. Utility emissions controls between those required under Title IV of the Clean Air Act controls and 85 percent;

B. Large non-utility controls between 55 percent and 70 percent;

C. Reasonably available control technology for mid-sized sources;

D. States should have a choice of regulatory systems whether it be using emission rates or a statewide emissions budget; and

E. States should have the ability to conduct regional modeling to determine the level of control needed to meet air quality standards. After these recommendations were presented to U.S. EPA, the Federal agency proposed the NOx SIP Call, requiring that 22 States develop State Implementation Plans to reduce utility emissions by 85 percent in the year 2002. The one-size-fits-all 85 percent requirement ignores OTAG's finding that ozone reduction benefits diminish with distance, as well as the recommendation for regional modeling to determine effective control levels. Rather, the SIP Call mandates the most stringent level of control for every State, instead of considering other options that might prove equally effective.

Ohio, West Virginia, Michigan, Virginia, South Carolina, Indiana, Illinois, Kentucky, Tennessee, and Alabama initiated a series of meetings to develop an alternative plan to reduce NOx emissions. In June 1998, six States known as the Midwest/Southeast Governors' Ozone Coalition submitted a plan that contained these main elements:

1. A Phase I early reduction program, with utilities achieving a 55 percent reduction by 2002 and a 65 percent reduction by 2004.

2. A Phase II plan to aggressively pursue attainment of the 8-hour ozone standard, which includes:

A. Complete "first look" modeling completed by July 2001;

B. Submission of a final plan by July 2003;

C. Additional controls installed by April 2007; and

D. Attainment of the 8-hour standard by October 2009.

In submitting the plan, we put forward a rational approach to more than adequately address long-range transport, provide a substantial down payment on the 8-hour standard, and determine whether additional reductions of nitrogen oxides or volatile organic compounds are needed to meet the new air quality standards.

U.S. EPA rejected this commonsense approach and, in the fall of 1998, U.S. EPA adopted its final rules virtually unchanged except for providing an additional 6 months for utilities to comply, until Spring of 2003. The rule required State Implementation Plans to be submitted to U.S. EPA by September 30, 1999.

Ohio had no choice but to appeal. The deadline itself precluded virtually any response but rote agreement with U.S. EPA's approach, and the rule is more burdensome than the Governors' plan without being more protective. On May 25, 1999, the Court issued a stay of the requirement to submit a SIP and will hear oral arguments on our appeal on November 9, 1999.

Because the implementation of the NOx SIP call has been stayed by the U.S. District Court of Appeals, Administrator Browner has announced her intent to require essentially the same NOx reductions in 12 States through rulemaking under Section 126 of the Clean Air Act. Ohio does not believe that U.S. EPA in fact has the authority to take this action. U.S. EPA's interpretation of Section 126 is that there is a "typographical error," and that the what the law says is not what Congress intended it to mean. Ultimately, only Congress can clarify whether the law reflects its intentions, but in the meantime, Ohio will argue that it must be administered as it stands.

I want to assure the members of the committee that Ohio wishes to be a partner with U.S. EPA and the States in establishing protective air quality standards and devising cost-effective strategies to meet them. Regrettably, Ohio has been characterized as more interested in litigation than in clean air. This is not at all the case. The plan we presented would have achieved the 8-hour ozone standard a full year sooner than the Clean Air Act allowed. I remain open to discussion with U.S. EPA and other affected States about the best way to reduce ozone levels both in the northeast and in the Midwest.

Thank you for this opportunity to present this testimony to the committee.

Senator VOINOVICH. I think we need to put this all in perspective. No. 1, the court has ruled that the 8-hour standard and the 2.5 particulate standard exceeded their authority, for whatever reasons, and that will be hung up in court for who knows how long.

We have a separate matter, and that's the 126 petition that has been filed by the northeastern States. The agency has taken a position that they're going to back off from the SIP Call based on the 8-hour standard and the $PM_{2.5}$ because it's in court, but they're going to go forward anyhow with the SIP Call at the 85 percent requirement. By the way, that's based on the 8-hour standard and the 2.5.

The reality of it is that that will be contested in court, and I don't know how the court will rule, one way or the other. We have a situation, I think, where overall southern States and the midwest have said, "We want to go forward, and we're moving forward on the basis of an 8-hour standard," and I'm not sure if your State will ever meet the 8-hour standard, regardless of what you do in your State——

Ms. STAHL. We'll keep trying.

Senator VOINOVICH. I know, but the point is that you have this situation where things are in limbo and we do have a chance to move forward reasonably with a reasonable SIP Call, and I think most of the southern and midwestern States would be willing to do that if we could work something out with the agency. But the agency says, basically, "85 percent, take it or leave it, goodbye."

Now, we can let that hang out there for who knows how long, and we don't do anything for Ohio's environment or your environment or the country's environment, or we can sit down and say, "Here are these people who are taking a reasonable approach. It may not be exactly what the agency dictates, the one-size-fits-all, but it's a reasonable approach that we can get started with." I think that's the real issue that needs to be addressed today. I don't know whether you do that through legislation, or maybe the members of this committee on a bipartisan basis, people from your part of the country and our part, write a letter to her and say, "Look, here's the deal; could you sit down and work something out? These people seem to be willing to go forward and start dealing with this problem." Or we can just let it hang out there and nothing is going to get done, although I know you are moving forward in Michigan and I know Ohio is moving forward. Our utilities, many of the are going to do it anyhow, but it would be nice if it could be worked out with the Environmental Protection Agency.

Do either one of you want to comment on that? Mr. Harding?

Mr. HARDING. Well, Senator, I absolutely agree with that. I think, again, there could be some common ground, and it is certainly worth the effort. I think the result of not doing that is the result that we have had, and that is litigation which is preventing further clean air in this country. In fact, we don't have a standard now; many of us were of the opinion when the 8-hour standard was promulgated, that this was going to cause a problem.

So we do need to move forward and I very much agree with your statement.

Senator INHOFE. I would like to comment also that there are a lot of us who would like to propose and work and craft legislation that would replace the SIP Call and the 126 petitions, and we would certainly call on everyone who has been testifying here today from all of the regions to help us work on this. I would make that as an official request.

If it's all right, Senator Lieberman, we've had the Majority Leader call a meeting and we're going to have to go to that. Normally we like to visit personally after things are over since the witnesses have gone to so much trouble and inconvenience in being here, but there won't be time for us to do that. So I just want to thank you for being here today and for the testimony you have offered.

You will receive questions for the record from members of this committee. That will become a part of the record of this hearing.

Thank you very much.

[Whereupon, at 10:37 a.m., the subcommittee was adjourned, to reconvene at the call of the Chair.]

[Additional statements submitted for the record follow:]

STATEMENT OF MAINE STATE SENATOR SHARON TREAT

INTRODUCTION

Good morning. My name is Sharon Treat, and I am a State Senator in Maine, where I am the Senate Chair of the Legislature's Joint Standing Committee on Natural Resources. I also chair the National Conference of State Legislatures' Science, Energy, and Environmental Resources Committee, although I am not here today to speak on that committee's behalf. I serve as one of Maine's two representatives on the Ozone Transport Commission, and am a regular participant in regional forums through the Northeast States for Coordinated Air Use Management (NESCAUM), an organization representing the air pollution control programs in the eight northeast States.

Thank you for the opportunity to speak to you from the perspective of a Northeast State about ozone transport and its regulation. There are three ideas which I think must shape any response to this issue. First, the regional transport of ozone is a very real and significant problem. Second, the amount of ozone flowing into the northeastern States from the west prevents them from effectively limiting their ozone levels. Third, without effective federal regulation of ozone transport levels the northeastern States will never be able to attain compliance with existing or proposed EPA standards.

It is unfortunate that testimony on each panel is limited to only one representative of the more than dozen States that support the Environmental Protection Agency's efforts to control NOx pollution under Section 110 of the Clean Air Act. Our perspectives and experience do differ, and it would have been helpful for the committee to hear from additional supporting States. My comments, therefore, are from the regional perspective of the Northeast States and reflect the regional approach Maine is taking in collaboration with our neighbors. I am honored to be here to present both Maine and the Northeast States' support for sound and equitable solutions to our Nation's shared air quality concerns.

At the outset, it is important to stress that the Northeast States are not asking our upwind neighbors to take any regulatory actions under Section 110 that we are not willing to impose upon ourselves. Nor are we asking upwind States to take actions that only benefit distant downwind States. The reality is, whether downwind or upwind, ozone pollution is a problem that needs to be addressed. It affects our most vulnerable citizens, children and the elderly, and it knows no political boundaries.

Already this year, the smog has been really bad—and summer just started Monday. Between May 1 and June 12 of this year, Ohio experienced 181 exceedances of the health-based 8-hour ozone standard, with 12 days over 0.085 parts per million (ppm); Michigan had 76 exceedances, with 15 days over 0.085 ppm; North Carolina had 43 exceedances, with 7 days over 0.085 ppm; and Georgia had 39 exceedances with 15 days over 0.085 ppm. North Carolina and Ohio also have multiple exceedances of the one-hour standard during this time frame. Clearly, any reductions in NOx emissions by upwind States will directly benefit the health of their citizens and the quality of their environment.

REGIONAL OZONE TRANSPORT

The scientific community has long recognized the regional nature of the smog problem. Over the past 25 years, a significant amount of research has appeared in the peer-reviewed scientific literature documenting that the long-distance movement of smog affects not only the Northeast, but areas in the Midwest and Southeast as well.

Scientific observations have documented ozone transport across the eastern United States. In 1980, George Wolff, now with the General Motors Research Laboratories, coined the term "ozone river" to describe three July 1978 ozone episodes in which "a distinct area of high ozone concentrations was observed flowing northeastward in a 'river', extending from the southwest Gulf Coast to New England." In 1979, scientists using aircraft measurements followed a mass of high ozone from central Ohio into the Northeast Corridor where incoming ozone levels reached 90

parts per billion. Most recently, scientists with the North American Research Strategy for Tropospheric Ozone (NARSTO) observed ozone levels above 80 parts per billion entering the western (upwind) boundary of the Northeast Corridor on the morning of high ozone days during the summer of 1995.

These levels of transported ozone have been observed for a number of years, are a significant fraction of the 120 parts per billion one-hour federal ozone standard, and are clearly beyond the control of local reduction efforts within the Northeast Corridor. Of course, the Northeast is not alone in suffering the ill effects of transported smog and its precursors. The Oklahoma Department of Environmental Quality's May 1999 issue of its Air Quality Update recognized that long range ozone transport also affects Oklahoma. The Department discovered during a review of its ozone data from 1998 that pollution from wildfires in southern Mexico likely contributed to high ozone levels in the Oklahoma City area (attached). It isn't a big leap in logic to recognize that forest fires and the burning of fossilized trees (coal) have similar transport impacts when the wind blows.

Recently, the chief of the air pollution control division in Ohio, Robert Hodanbosi, explained during a June 1999 high ozone event in the city of Columbus that ozone levels built up because "the sun is very bright today, there are no clouds, and the wind isn't blowing." (The Columbus Dispatch, June 10, 1999) That is correct. When the wind blows, the Northeast receives this pollution.

Just as the flow of ozone from points west overwhelms the pollution control efforts of Pennsylvania, Maryland, New York and others, emissions from those States take their toll on New England. Ultimately, each State's air quality is inexorably linked to that of its neighbors as emissions and ozone cascade from west to east.

TRANSPORT TO MAINE

Maine is uniquely situated at the receiving end of much of this smog. Locations along the Maine coastline far removed from urban centers, such as Acadia National Park, typically exceed the one-hour federal ozone standard during the late evening and overnight hours. Indeed, some of the highest levels of ozone in the State and in the country have been measured in Acadia Park. These are times when the ozone could not possibly be formed locally because there is no significant sunshine available to drive the ozone-forming chemical reactions. Maine and many rural areas of the country will be unable to achieve clean air unless all major smokestacks in the Eastern United States are required to implement cost-effective modern pollution control equipment. In fact, it was the 37 State OTAG (Ozone Transport Assessment Group) process that identified large fossil fuel fired utility and non-utility boilers as the most cost-effective method to reduce the transport of ozone in the eastern United States

Let me be perfectly clear that regional upwind control efforts are needed to augment and not replace additional local measures. Our demand is simply that the bulk of our local measures go toward achieving clean air and not offsetting someone else's pollution. To put things in perspective, the NOx emissions from all source categories (e.g., automobiles, trucks, power plants) in Portland, Maine's largest city, totaled almost 28,000 tons in 1996. By comparison, a single power plant in southern Ohio emitted over four times as much NOx during the same year.

MAINE'S RESPONSE TO AIR QUALITY PROBLEMS

While the State of Maine is itself not subject to the NOx SIP Call, Maine's Governor Angus King has made a commitment to achieve the same level of NOx reductions from major stationary pollution sources within the State. Maine has also signed an Ozone Transport Commission Memorandum of Understanding (MOU) committing the State to achieve similar NOx reductions from our major stationary sources. The State joined with 11 other States in 1994 and agreed in an MOU to reduce NOx emissions from electric utilities and large stationary sources by up to 75 percent, roughly twice the mandatory reductions required under the Clean Air Act for sources located in nonattainment areas.

It is my understanding that all the NESCAUM States are seeking to implement NOx controls in the timeframes envisioned in EPA's final rule. While the recent injunction imposed by the D.C. Circuit Court has temporarily delayed the federal requirement for action, it has not diminished the activity of those Northeast States committed to achieving clean air in the most cost-effective manner possible.

Maine has received some criticism of its other air quality control measures, particularly after the failure of the aborted Car Test program. However, the fact is Maine has implemented a motor vehicle emission inspection and maintenance program and has adopted the California Low Emission Vehicle Program. Maine ceased the use of reformulated gas (RFG), but only after an extensive drinking water test-

ing program showed clear evidence of widespread MTBE contamination. The low RVP fuels now required in Maine will meet EPA requirements without the use of MTBE. Additional mobile source reductions are achieved through a Stage II Vapor Control System.

Maine can and will impose tough restrictions on both NOx and VOC emissions, but without reductions in upwind States will still have a smog problem. Speaking as an elected official, who has herself long supported stringent in-state controls on stationary and mobile sources, I can report that this creates a major public policy problem in our State. Mainers and other northeasterners have been willing, time and again, to impose restrictions on themselves and their industries to control pollution. But when scientific modeling and data demonstrate that implementing an I/M program will not alter attainment status, and that the emissions from a single uncontrolled Midwestern power plant can emit twice as much NOx per day as all sources in Vermont combined, it is understandable that the inconvenience and cost of such a program can be a tough sell for the downwind State.

NEGATIVE IMPACTS OF LOW AIR QUALITY

Exposure to chronic ozone levels below the one-hour standard harm the public's health in a number of ways. These include:

- Increased airway responsiveness in the general population.
- Increased severity and incidence of asthma attacks.
- Increased severity and incidence of respiratory infections.
- Increased prevalence of chronic respiratory symptoms.
- Development of chronic respiratory bronchiolitis.,

For example, in Maine ozone causes breathing difficulty for 395,000 people—approximately one-third of our population—who have respiratory ailments, are elderly or are children. The American Lung Association of Maine recently stated that "one out of every 12 kids in Maine has asthma"—a frightening statistic for our next generation.

In addition to ozone health effects, Maine as well as the entire Northeast is affected by other environmental and public health impacts caused by NOx pollution. Maine's economy is dependent on our natural resources—forestry, fishing, agriculture and tourism. Chronic exposure to elevated smog levels may be accelerating the death rates of some tree species in our eastern forests, which could alter the forests' value as timber and recreational resources. A study by the National Academy of sciences recently reported that leaves of ozone-damaged plants often die and fall off in late summer, reducing the beauty of a forest's fall foliage. Fall foliage tourism in Maine is a multi-million dollar industry.

Nitric acid formed from NOx is a constituent of acid rain that contributes to long-term damage in many eastern lakes and forest soils. Indeed, acid rain has been pointed to as the culprit in the diminished productivity and value of northern Maine and Vermont sugarbush (maple syrup producing trees). Nitrogen deposited from the air into bays and estuaries leads to oxygen-depleting algal blooms, harming aquatic life in some of our most economically productive marine ecosystems.

CONCLUSION

In conclusion, for over 20 years our country has perpetuated an illogical system in which pollution is free from the law as soon as it crosses State lines. The illogic and inequity of punishing downwind States for forces beyond our control has led to a host of tortured policies, like EPA's decision in 1982 to designate the State of Rhode Island to be in "attainment but for transport." In human speak this means the air was clean but for the pollution. After 20 years of collecting and reviewing the scientific data, EPA has finally responded with a measured first step to diminish the magnitude of NOx transport across State lines. All States will benefit from the cost-effective pollution reductions required under the EPA approach.

It is unfortunate that the inaction on the part of our neighbors has forced us to turn to the federal government for relief. As a State legislator, I would have preferred standing shoulder to shoulder with my upwind counterparts to announce that States had joined together in a necessary effort to protect public health. Sadly, that option has not and apparently will not present itself. It is precisely in the cases when States can not reach rational outcomes alone that federal action is required. EPA should be commended for its recent efforts to bring science and fairness back to our air pollution control efforts. Thank you.

RESPONSE BY SENATOR SHAREN TREAT TO ADDITIONAL QUESTION FROM SENATOR INHOFE

Question: Senator Treat, Mr. Harding, from Michigan testified on the second panel that OTAG recommended that the States be given additional time to conduct "subregional" modeling. Were the States given the additional time to conduct this modeling?

Response. In it final report, OTAG recommended that States be given additional time to conduct local and subregional modeling and air quality analysis. It seems evident that the OTAG membership understood that even after transported emissions were controlled, there would continue to be some areas with ozone air quality problems. These areas would obviously need to undertake additional efforts to evaluate the nature and extent of their air quality problems through local or subregional planning efforts. In fact, EPA's timeline for implementing the 8-hour ozone standard provides for additional modeling time that is very consistent with OTAG's recommendations.

RESPONSE BY SHARON TREAT TO ADDITIONAL QUESTIONS FROM SENATOR LIEBERMAN

Question 1. How difficult will it be for Maine to achieve the standards without a regional control strategy?

Response. Attainment of the 8-hour ozone standards in Maine is almost wholly dependent upon the implementation of a regional control strategy. While local emissions certainly have an impact on ozone air quality in Maine, regional air quality modeling conducted by the U.S. Environmental Protection Agency (EPA), the Ozone Transport Assessment Group (OTAG), and others has shown conclusively that pollution transport is responsible for most of our air quality problems. Air quality modeling conducted by EPA predicts that regional controls will allow most or all of Maine to meet the 8-hour ozone standard; at least four counties will violate this standard without regional controls.

Although the 1-hour ozone standard has been revoked throughout Maine, the long-term maintenance of this standard is also largely dependent upon upwind emission reductions. Regional controls of the magnitude required by the NOx SIP Call and Section 126 rulemakings will play a key role in ensuring that Maine continues to meet this standard, and will become even more important should the standard be reinstated.

Question 2. Could you please describe how the proposal from the Southeast/Midwest Governors would affect Maine's efforts to control acid rain and air pollution? How does the proposal compare to the current NOx reduction requirements scheduled to begin in 2000 under the existing Acid Rain Program?

Response. The Southeast/Midwest Governors' proposal would significantly hamper our efforts to control acid rain, ozone and particulates. In addition to requiring less stringent controls, the Governors' proposal does not contain a cap on emissions. As a result, emissions would continue to grow in future years. Even if fully implemented, this proposal would result in emissions levels that were 21½ times higher than those under the NOx SIP Call in 2007. In fact, by 2007 this growth would return NOx emissions back to the same levels achieved by the Acid Rain Phase II NOx control levels in 2000. Clearly, the acid rain benefits provided by the Govemors' proposal fall far short of those provided by the NOx SIP Call.

RESPONSE BY SHARON TREAT TO ADDITIONAL QUESTION FROM SENATOR BAUCUS

Question: What advantages and disadvantages do you believe that the "Governors' proposal" on NOx reductions, as alluded to in the hearing, would have relative to EPA's proposed NOx SIP call?

Response. As I understand it, the Govemors' proposal promises early "substantial reductions" by 2002 (the lesser of a 55 percent reduction or a 0.35 lb. per million Btu emission rate), with additional controls by 2004 (the lesser of a 65 percent reduction or 0.25 lb. per million Btu emission rate). Although this proposal touts its "early reductions," it offers no more than a marginal short-term advantage over the NOx SIP call. Since the NOx SIP call amounts to the equivalent of an 85 percent NOx reduction from power plants in the 3-year period prior to May 2003, we could expect that two-thirds of these reductions (or a 57 percent reduction) would already be achieved by May of 2002. The Govemors' proposal offers no real short-term advantages.

Over the long term, the Governors' proposal will result in significantly more transported pollution, since emissions are not capped. By 2007, NOx emissions

under the proposal will have grown to the same level seen under the Acid Rain Program Phase 11 NOx controls. Even worse, any future reductions are contingent upon upwind State's modeling efforts. Maine and the other northeast States would once again be at the mercy of upwind States that have no incentive to address impacts beyond their own borders. Implementation of this program would expose millions more to unhealthy air pollution, and cost the northeast and Mid-Atlantic States millions of dollars to mitigate the effects of transported emissions.

STATEMENT OF MAYOR THOMAS NYE, CITY OF HAMILTON, OHIO

Good morning, Chairman Inhofe, Senator Graham, my own Senator Voinovich, and other members of the Subcommittee. My name is Thomas Nye, and I am the Mayor of the City of Hamilton, Ohio. Hamilton is a city of approximately 65,000 located in Butler County in southwest Ohio. Hamilton is a public power community that has owned and operated a non-profit municipal electric utility for its citizens since 1893. I appreciate the opportunity to testify on behalf the Ohio Municipal Electric Association and its 80 public power communities, on the need for the United States Environmental Protection Agency (EPA) to pursue cost effective strategies for the control of NOx emissions. EPA's current NOx strategy, calling for up to 85 percent reductions in electric utility NOx imposed through a State Implementation Plan Call, and backed up by the imposition of controls under a Federal Implementation Plan or Clean Air Act Section 126 action, has not adequately recognized the potential impacts on small public power communities. Public power communities therefore urge EPA to adopt meaningful, yet reasonable, NOx reduction policies that recognize and mitigate impacts on small entities and localities. We also urge the Congress to promote cost-effective air quality regulations that provide maximum flexibility and assistance to local governments and small businesses.

THE CITY OF HAMILTON AND ITS MUNICIPAL ELECTRIC SYSTEM

The City of Hamilton owns and operates a municipal electric system for its residents, commercial businesses and industries. Hamilton's economy is supported by industrial operations including Champion International, International Paper, Hamilton Caster, Hamilton Die Cast, Krupp-Hoesch, Krupp-Bilstein, Hamilton Fixture, and General Electric, to name a few.

The City of Hamilton is pursuing economic development strategies to recycle abandoned and underutilized industrial and commercial properties by actively participating in the redevelopment of "brownfields." Placing these environmentally challenged properties back into productive re-use will allow Hamilton to be actively involved in the revitalization of our industrial corridor and central city. Benefits of the redevelopment of brownfields sites in the City of Hamilton include the creation of family-wage jobs, increased private investment, the retention and expansion of existing businesses, and recruitment of new high technology companies. The reuse of existing properties in our center city can also help reduce sprawling growth outside the City and throughout the region, which will help slow the increase in traffic over the long-term, in turn reducing air pollution from vehicles.

However, Hamilton's quality of life, and our ability to attract jobs through brownfields redevelopment and other business recruitment efforts, depends in large part on providing cost-effective public services to residents and private sector employers. That is why Hamilton operates a municipal electric utility, and that is why we are very concerned that EPA's current Clean Air Act policies may unduly raise the costs of service to our customers, and threaten the viability and economic competitiveness of our public power system.

Hamilton's municipal electric system consists of local electricity transmission and distribution wires, and three electric generation facilities totaling 206.7 megawatts in capacity. This electric generation includes 135 megawatts at the fossil-fired Hamilton Municipal Power Plant, 70.2 megawatts at Greenup Hydroelectric Plant on the Ohio River and 1.5 megawatts at the Hamilton Small Hydro located on the Ford Hydraulic Canal. Hamilton's Municipal Electric Plant contributes significantly to the local economy, generating purchases from local businesses of at least $2.6 million, contributing $12.8 million in household earnings, supporting 371 full and part time jobs in the greater Cincinnati region, and contributing up to $160,000 for the local tax base. Boiler #9, a 50 megawatt coalfired boiler subject to EPA's NOx SIP Call, FIP and Section 126 control strategy, is the largest and most cost-effective unit in Hamilton's fossil fuel plant. The Greenup hydroelectric facility is our primary source of power, backed up by Boiler #9 when river flow conditions do not permit generation.

In addition to overall concerns about EPA's NOx strategy that we explain below, Hamilton is very concerned that EPA's NOx strategy may adversely impact the Hamilton electric system by improperly overcontrolling Boiler #9 under EPA's proposed NOx cap-and-trade program. A second concern of Hamilton is that EPA's NOx control strategy will neither recognize the role of our hydroelectric facilities in our electric system, nor the massive decrease in NOx and other air pollution emissions that our generation system has made since 1981, when we purchased the Greenup hydroelectric facility and began producing the majority of our power through clean hydroelectric generation. See Attachment 2 (demonstrating reductions of more than 7,200 tons in NOx, SO_2, particulate and VOC emissions during EPA baseline years of 1995–97, including 2,700 tons of NOx). EPA is currently considering Hamilton's requests, and we are hopeful that the Agency will take into account our reasonable and justifiable concerns.

Today, I wish to emphasize that Hamilton's specific concerns are symptomatic of the overall impact of the federal NOx control strategy on public power communities and other small business entities: a stringent, costly and uniform federal mandate will inevitably have negative impacts on the smallest entities and localities. In our belief, EPA has not done an adequate job of identifying and mitigating these impacts.

Hamilton's first specific concern involves the potential over-control of Hamilton's Boiler #9 under EPA's proposed method for establishing a baseline of emissions for affected units, and allocating NOx trading allowances to cover the emissions that would be allowed from that baseline. Under EPA's proposed NOx trading system, Boiler #9 will be allocated allowances based on its historic usage. However, due to exceptional circumstances during EPA's proposed baseline utilization period, Boiler #9 could receive a serious underallocation of allowances.

Specifically, the 1995–97 baseline years, upon which the EPA NOx budgets established for individual States have been calculated, were unusual years for the operation of Boiler #9. In 1995, there was a major rehabilitation of Boiler #9 during the summer ozone season, reducing operation by 30 percent. In 1996, the utilization of Boiler #9 was reduced nearly 50 percent, due to boiler control upgrades necessary for a dry desulfurization pollution control project. Likewise, in 1997, the availability of Boiler #9 was only 59 percent due to a rebuild of the associated generator and final tie-in of the desulfurization project. Unless these exceptional circumstances at the Hamilton plant are taken into account in EPA's allowance allocation, Boiler #9 will be starting at a serious disadvantage under an already stringent regulatory program. (See also Attachment 3, explaining Hamilton's situation under EPA NOx control strategy).

Hamilton's second specific concern is that EPA's federal NOx allowance trading program will not take into account the role of our Greenup hydroelectric facility at our electric system, or the substantial reductions in NOx and other air pollutants that Hamilton has already undertaken through this hydroelectric system, at great cost to our community. Hamilton relies on the Greenup hydroelectric facility as its primary source of electric generation. Hamilton has substantially reduced the municipal utility's emissions of NOx and other air pollutants through its large investment in the hydroelectric facilities at the Greenup Locks and Dam on the Ohio River and at Hamilton's Ford Hydraulic Canal. The amount of power generated from this "run of the river" Greenup facility (unlike at darns with impoundment reservoirs) depends on river flow conditions and Ohio River navigation requirements regulated by the Army Corps of Engineers. The facility can only generate when there is sufficient distance between the upstream and downstream pools based on flow conditions, and when the Army Corps permits flow into the lower pool. As such, generation of electricity is a secondary function of the Greenup Locks and Dam, in which we are making use of an existing facility for the environmentally-preferable production of clean energy. However, in those cases in which the run-of-the-river does not permit electric generation, the Greenup facility is backed by Hamilton's coal-fired Boiler #9.

As a result, EPA's proposed allowance allocation to Boiler #9 may not provide sufficient to the unit if utilization is increased to substitute for hydroelectric output in order to ensure that electric demand and reliability are met. This situation imperils the City of Hamilton's ability to provide cost-effective service to its citizens if the hydroelectric plants, due to flow conditions and navigation requirements beyond Hamilton's control, are unable to meet the production levels accomplished during the EPA 1995–97 baseline emissions period. Extended hydroelectric plant outages are likely to occur during the ozone season when stream flows are low, which may leave the City with insufficient NOx allowances to meet its needs. (See also Attachment 3).

Hamilton's switch from sole reliance on fossil-fired electric generation to small hydroelectric generation during the early 1980s has made its 1995–1997 heat input baseline artificially low. Hamilton has actually decreased its use of fossil fuels approximately 40 percent from 1981 levels while still supporting an increase of 50 percent in electric demand over the same period. (See also Attachment 3). This is a significant accomplishment by a public power community and represents an approach that is significantly different than the course of action typically taken by investor-owned utilities during this period. Hamilton has not accomplished this without cost to the community, as our $ 170 million investment in hydropower has imposed an additional $29.534 million in operating and capital costs than had a similar sized coal-fired facility been developed during the 1980's. These voluntary pollution prevention expenditures are in addition to Hamilton's voluntary investments in advanced coal scrubbing technology, composting facilities? and other environmental initiatives that have resulted in more than $2.5 million in yearly debt service. (See Attachments 4 & 5).

Since EPA's proposed allowance allocation is based on historical heat input, and Hamilton has already cut its heat input by 50 percent , the municipal electric system is expected to receive only 50 percent of the allocations that Hamilton must have to support its required generation. (See Attachments 3 & 6). In short, EPA's proposed NOx control and trading strategy may significantly overcontrol Hamilton's Boiler #9, despite the large investments we have made in clean power hydroelectric generation.

We believe that if EPA's proposed NOx control strategy is imposed on Hamilton, it may threaten the viability of our municipal electric system. For example, even if Hamilton installed technology to meet EPA's 0.15 lb/mmBtu limit—which is a cost-prohibitive option—EPA's proposed allowance allocation to Boiler #9 (87 tons per ozone season) will permit Hamilton to operate the unit for only 66 days during the ozone season without purchasing significant additional allowances. Further controls on Boiler #9 are not cost effective. An independent engineering Bern has estimated the cost-per-ton of NOx removed for Hamilton's Boiler #9 at $7,554. This is well in excess of EPA's estimated cost of $1,468/ton removal for large electric generating units.

Likewise, if Hamilton must purchase additional NOx allowances to cover its typical generation, it will be placed at a different starting point from other affected utilities, and at a significant competitive disadvantage. The City may be forced to pay extraordinary allowance or substitute electricity prices during those periods when the City cannot rely on its hydroelectric generation to cover typical demand -if those commodities are even available. Such a situation could wreak havoc on municipal budgets. Such risks can, of course, be controlled by purchasing options and through other market tools. However, small public power communities lack the resources and expertise to play the commodities markets. Our citizens want us to be public servants, not Wall Street hawks.

I would also like to note with appreciation that both Senator Inhofe and Senator Voinovich have monitored Hamilton's concerns regarding the impact of the NOx control strategy on our municipal system, and urged EPA to take our situation into account. EPA is expected to issue a final rule on a federal NOx trading system in July, which could take Hamilton's requests into account. We appreciate the Senators' attention to this matter, and the Agency's consideration of our situation.

Hamilton's concerns about the potential impacts of EPA's NOx control strategy are not unique among Ohio public power communities, and we believe that these concerns are shared by public power systems throughout the proposed EPA NOx control region, as explained further below.

EPA'S NOX CONTROL STRATEGY MAY ADVERSELY IMPACT PUBLIC POWER COMMUNITIES

From an overall perspective, Ohio's public power communities are concerned that EPA's NOx control strategy goes beyond what is necessary to protect public health and the environment from ozone pollution, and requires NOx controls that are not cost-effective for small businesses and localities.

The impact of EPA's strategy could be particularly difficult for smaller sources and entities. EPA itself has recognized the potential for disproportionate impact on small entities, in its final Regulatory Impact Analysis for the 8-hour ozone standard (at pp. 11–27, 11–28, 11–29):

Small entities, all other factors being equal, generally have less capital available for purchase of add-on pollution control technology than large entities. In addition, the control cost per unit of production for small entities will likely be higher than for large entities due to economies of scale. Thus, control measures requiring the use of add-on control technology may cause small entities affected by State rules to

experience disproportionate economic impacts compared to large entities if no strategies to mitigate potential small entity impacts are available for implementation by States.... Consequently, EPA is encouraging States to exercise regulatory flexibility for small entities when developing strategies to meet the standards adopted today. While some States may need to turn to small businesses for emission reductions, small businesses will likely be among the last sources the States will choose to control. States may consider controls on small businesses only if such businesses are a significant part of an area's nonattainment problem and attainment cannot be reached through application of all available cost-effective measures to major sources.

To the extent States consider controlling small businesses, EPA believes there are many ways States can mitigate the potential adverse impacts those businesses might experience. For example, States could choose to exempt or apply less stringent requirements to small businesses.... States could also extend the effective date for control requirements for small businesses to 2010 or later.... States could also choose to apply control requirements to other businesses first, before requiring them for small businesses.

Hamilton and the Ohio Municipal Electric Association strongly agree with this EPA recognition in the ozone impact analysis, and thus calls upon EPA to take more meaningful action to ensure that this message is translated into the Agency's ozone and NOx implementation policies. Although EPA has taken the proper step of exempting the smallest utility sources (less than 25 megawatts) from NOx controls, EPA has not assessed the impacts of its NOx strategy on small entities, like Hamilton's municipal utility, that may own both small and larger utility units. Given the stringent nature of EPA's NOx control strategy, and the disproportionate impacts to small businesses and localities that may result, Hamilton supports approaches like the so-called "Governors' Alternative" NOx control strategy that was proposed by then-Governor Voinovich, which is being pursued by Ohio and other States. Although Ohio public power believes that all approaches, including the Governors' Alternative, must better assess and mitigate impacts on small entities, we believe that the Governors' Alternative can achieve substantial reductions in utility NOx emissions of 65 percent over the next 5 years, in a fashion that is cost-effective and feasible for affected municipal electric systems. We call on EPA to consider working cooperatively with States like Ohio to achieve needed NOx reductions through this reasonable alternative plan.

EPA'S CLEAN AIR ACT IMPLEMENTATION SHOULD BETTER RECOGNIZE AND IDENTIFY IMPACTS ON SMALL ENTITIES AND LOCALITIES

Given the potential for adverse, disproportionate impact on small entities from EPA's NOx control strategy, Hamilton and the Ohio Municipal Electric Association urge the Agency to consider more fully how to mitigate such impacts. Most importantly, EPA should commit to performing a full analysis of small entity impacts under the Small Business Regulatory Fairness Act, or "SBREFA."

Indeed, EPA has encouraged States to identify and mitigate impacts of Clean Air Act regulations on small entities. In April, 1998, EPA issued "Guidance on Mitigation of Impact to Small Business While Implementing Air Quality Standards and Regulations." This guidance calls for "implementation strategies that mitigate adverse impacts on small sources . . . wherever possible and appropriate, including the exemption of small sources from regulations, compliance flexibility, extended compliance deadlines, and compliance assistance for small entities. EPA has issued this guidance to States, but has not made sufficient efforts to ensure that States implement the guidance, and has not made adequate efforts to implement such policies itself.

EPA's effort to identify and mitigate impacts on small entities should begin with the performance of a full SBREFA analysis for the NOx SIP call. Second, EPA should ensure that any SBREFA analyses for the NOx control strategy include the proper universe of public power communities. Specifically, the definition of "small entity" under SBREFA with respect to electric utilities includes those utilities that sell less than 4 million megawatt hours of power annually. This SBREFA standard includes Hamilton, as well as all other municipal electric generators in Ohio. However, EPA's SBREFA analysis conducted under its proposed FIP and its Section 126 rules does not appear to have used this standard, and as a result has not properly identified impacts of the NOx control strategy on public power communities like Hamilton. Third, once these impacts are properly identified, the Agency should consider the use of compliance flexibility and assistance for small public power systems, to ensure that they can comply in a cost effective manner, and that they are not faced with a competitive disadvantage against larger electric systems as industry deregulation and competition looms on the horizon.

CONGRESS SHOULD PROMOTE CLEAN AIR ACT POLICIES THAT ARE COST-EFFECTIVE, WITH COMPLIANCE ASSISTANCE TARGETED TO SMALL ENTITIES AND LOCALITIES

Hamilton greatly appreciates the efforts of this Subcommittee to oversee the implementation of EPA's NOx control strategy, and encourages you to continue playing an appropriate role to ensure that air pollution regulations are effective and reasonable. In addition to oversight, Congress should consider how it can enact legislation that will promote air quality strategies that are clear, cost-effective and supportive of market-based emissions control systems. Specifically, Congress should consider:

- Establishing a NOx cap-and-trade system for the eastern United States. Localities, industry and EPA agree that market trading of NOx emissions is the most cost-effective manner to achieve NOx reductions. EPA is attempting to implement such a system. However, any system implemented by EPA under the current regulatory climate could be confusing and counter-productive, particularly for small entities. EPA's proposed federal NOx trading system will not be applied uniformly over the eastern United States, but instead through a hodgepodge of voluntary State programs and federal mandates. The implementation of EPA's proposed system could be particularly confusing given recent federal court rulings regarding the 8-hour ozone standard and the NOx SIP Call, as well as the on-going litigation with respect to the SIP Call. In these uncertain circumstances, a NOx trading program could be ineffective, resulting in NOx credits that are too expensive and difficult to obtain for entities like Hamilton that will need them. This situation deserves congressional attention.
- Examination of SBREFA at U.S. EPA—EPA's performance of its obligations under the SBREFA statute has not adequately identified impacts from Clean Air Act regulations on entities like Hamilton. Congress should consider whether EPA is effectively administering its obligations under SBREFA and take appropriate oversight or legislative action to ensure that SBREFA does its job.
- Phasing In NOx Controls for Small Sources—As EPA has recognized, small entities and sources may need compliance flexibility and extended deadlines in order to cost-effectively comply with Clean Air Act regulations. Hamilton suggests that a regional NOx control strategy should be phased in, with the largest utility units controlled first, followed by smaller sources. Like the successful SO_2 Acid Rain program, a phased approach for NOx will focus on the most significant sources of pollution first, stimulate the development of control technologies and efficient pollution trading markets, and provide small entities with adequate time to meet their compliance obligations.
- Clean Air Partnership Fund—EPA has proposed a new program that would provide grants and other assistance directly to local governments for innovative approaches to air quality improvement. This "Clean Air Partnership Fund" is now being considered by Congress in EPA's budget proposal. The Fund could be available to assist local initiatives to clean the air through activities including the use of advanced technologies, energy efficiency and renewable energy projects, clean vehicles, and assistance to small businesses in reducing emissions. This sort of fund for local clean air innovation is exactly the type of assistance that localities like Hamilton need to make progress, without having to face increasingly stringent command and control mandates. I am certain that Hamilton could put the Fund to use to reduce emissions of NOx and other air pollutants, and we urge Congress to give serious consideration to this proposed program.

CONCLUSION

On behalf of the City of Hamilton and the Ohio Municipal Electric Association, I once again thank the Senators for the opportunity to testify today. Hamilton supports effective Clean Air Act requirements to reduce NOx and ozone pollution, but EPA needs to be more vigilant in identifying how these regulations might impact small businesses and local governments who need compliance flexibility in order to remain viable.

LETTER FROM MAYOR NYE

July 1, 1999.

Hon. James Inhofe, *Chairman,*
Committee on Environment and Public Works,
Subcommittee on Clean Air, Wetlands, Private Property and Nuclear Safety,
Washington, DC 20510.

RE: NOx REMOVAL COSTS FOR HAMILTON BOILER 9

MR. CHAIRMAN: During the course of my testimony and the following question and answer period, there seemed to be great interest by co-committee members regarding the estimated cost per ton of NOx removed for Hamilton Boiler 9. It was requested that Hamilton provide documentation of these estimated costs for entry into the public record.

Based on capital and O&M cost estimates prepared by the engineering firm SET, Inc. for the City of Hamilton's Boiler 9 (attachment 1), the total annual cost to install and operate a selective catalytic reduction system (SCR) to comply with the 0.15 lb/mmBtu NOx limit is $771,929 debt service and an additional $656,100 O&M (based on a 56.6 percent capacity, which is typical for Boiler 9). The debt service is calculated on the estimated cost as provided by SET, Inc., adjusted by 3 percent per year inflation for the period from 1995 to 1998 and amortized over 20 years at 4.5 percent interest (attachment 2). This equals 3.2 percent of the 1998 electric revenues for the entire Hamilton Municipal Electric System. Further, when calculated on a cost per ton NOx removed, the cost was over $7,554/ton. The basis for this is as follows:

1. Ozone season NOx production for Boiler #9 pre-SIP, FIP or 126 = 0.40 lb/mmBtu x 729 mmBtu/hr x 24 hr/day x 153 day/season x 0.565 (historic capacity factor of Boiler 9) x 1 ton/2000 lbs = 302 tons.
2. After installation of controls: 0.15 lb/mmBtu x 729 mmBtu/hr x 24 hr/day x 153 day/season x 0.565 (historic capacity factor of Boiler 9) x 1 ton/2000 lbs = 113 tons.
3. 302 tons—113 tons = 189 tons removed under EPA performance standard.
4. $1,427,689 annual cost/ 189 annual tons removed = $7,554 per ton NOx removed.

Part of the higher that expected removal cost is associated with our capacity factor of the boiler, but that is a reality based on the fact that Boiler 9 backs up our hydroelectric generation. However, even without the capacity factor issue the cost/ton NOx removed would be $4,274. Both are significantly higher than USEPA's estimated removal cost of $1,500/ton NOx.

Should there be anything additional that I may provide concerning this issue, do not hesitate to contact me at (513) 868–5834. Alternatively, feel free to contact Mary Moore, Utilities Environmental Administrator, at moorem@utilities.ci.hamilton.oh.us or at (513) 868–5908 ext. 1830.

Very truly yours,

THOMAS E. NYE, O.D.
Mayor, City of Hamilton.

RESPONSES BY THOMAS NYE TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

Question 1. Mayor Nye, in your testimony you were critical of the EPA's efforts to implement SBREFA. You stated that the EPA ignored the definition of a "small entity" with respect to electric utilities. If they had adequately considered SBREFA how would it have improved your situation?

Response. In its NOx SIP Call, EPA failed to undertake any of the analyses and outreach required by the Small Business Regulatory Enforcement Fairness Act of 1996 ("SBREFA"). Congress enacted SBREFA in order to protect small businesses, small organizations and small governmental jurisdictions, collectively referred to as "small entities," from disproportionate or unanticipated adverse impacts of Federal rulemaking activity. The analyses required by SBREFA must be undertaken prior to publication of any general notice of proposed rulemaking and must "contain a description of any significant alternatives to the proposed rule which accomplish the Stated objectives of applicable statutes and which minimize any significant economic impact of the proposed rule on small entities." U.S.C. § 603(c). In addition, agencies must conduct extensive outreach and coordination with small entity representatives during the regulatory process for significant rules. Likewise, agencies must publish final SBREFA analyses, including an assessment of alternative approaches to mitigate impacts on small entities, when a final rule is promulgated.

Such analysis and outreach for the EPA NOx SIP Call would have assured that the impacts on small entities were given due consideration, and mitigated where reasonable. The SIP Call will directly and undoubtedly impact small entities, like public power communities. However, EPA shirked its SBREFA obligations by arguing that the SIP Call will not directly "regulate" small entities, because the specifics of the SIP Call will be imposed by States who are being commanded to implement the program, rather than by EPA. EPA's approach to SBREFA in the SIP Call is, Hamilton believes, clearly contrary to the intent of Congress. Although this issue is currently in litigation (including through petitions raised by small public power communities), it may be necessary for Congress to clarify SBREFA to ensure that agencies like EPA are not able to evade the analysis and outreach that is necessary to mitigate the disproportionate impact of regulations as significant as the SIP Call on small entities.

Even where EPA has performed analyses for SBREFA (such as in the CAA Section 126 and NOx FIP rules), the analyses were limited in scope, and they used the wrong standard. Specifically, Hamilton was not permitted to submit comments to the Small Business Advocacy Review Panels that met to assess the potential impacts of the Section 126 and FIP rulemakings on small businesses. In order to submit any comments to these panels, our comments had to be submitted through our State trade association, American Municipal Power-Ohio (AMP-Ohio). No direct comments were accepted. The timeline for response to these panels were extremely short as well. The original letter from Thomas E. Kelley inviting comment was dated July 30, 1998, and the comments were due by August 11, 1998.

In addition, EPA used the wrong standard to define "small entity" in the utility industry in its SBREFA analysis. It appears that EPA assessed the potential impact of the Section 126 rule and FIP rules on small utilities by defining as "small" those utilities that own or operate small units, of less than 25 megawatts in size. And, because EPA proposed to exempt such small units from regulation, the Agency assumed that there will be minimal impact of the NOx rules on small utility entities. However, SBREFA and applicable small business regulations define "small entity" in the utility industry as an entity that sells less than 4 million megawatt/hours annually—whether that entity owns small utility units, large utility units, or both. In Hamilton's case, for example, our municipal utility system is a "small entity" under SBREFA that owns one "large" unit, Boiler 9 at 50 MW, and several small, less than 25 MW units. Many other public power communities would likewise fall under the SBREFA standard, even though they may own some larger utility units (which, of course, are fully subject to EPA's Clean Air Act regulations).

However, EPA has failed in its SBREFA analyses for the Section 126 and FIP rules to identify how its NOx strategy may have disproportionate impacts on small utility entities, and how these impacts can be mitigated. The Agency has not properly assessed how the typical lack of capital, lack of staff resources, lack of pollution control expertise, and diseconomies of scale of these smaller systems may make it more difficult for them to cost-effectively implement Federal regulatory mandates and remain competitive in the utility industry. EPA itself has recognized the potential for disproportionate impacts to small entities from its Clean Air Act rulemaking, and even issued guidance to States to urge them to mitigate such impacts.

If EPA had performed a full SBREFA analysis for its NOx rules as Congress intended, I believe the impacts on public power communities like Hamilton (e.g., larger cost per ton removal, less staff to track and administer the program, less customers over which to spread the costs of compliance, and Hamilton's significant debt load for voluntary environmentally favorable projects, to name a few) would have been recognized, and could have been mitigated. A more flexible pollution control program could have been developed to ameliorate impacts on Hamilton and other small entities. Commenters like Hamilton have attempted to offer suggestions to EPA for compliance flexibility for small public power communities. However, as conducted by EPA in its NOx rulemaking process, we do not perceive that the Agency's SBREFA work has had any meaningful effect on these rules.

In sum, EPA has either evaded its SBREFA obligations or performed inadequate analysis and outreach that have not identified the disproportionate impacts on small utility entities that may take place under its NOx control strategy. The Agency has acknowledged the real potential for such impacts. If EPA conducts a full and proper SBREFA analysis for its NOx program, it could better identify how to avoid small entity impacts through compliance flexibility for small public power communities.

Question 2. Mayor Nye, now that the EPA has issued the stay for the SIP call, how does that affect your planning? Will you go forward with the Governors proposal or try and implement the EPA's plan?

Response. Hamilton's only realistic choice is to follow the rules that are adopted and implemented by our State, although we are very concerned that the confused

regulatory situation will make it difficult for us to plan for our future pollution control and utility operations. At this point, we do not know whether we will be asked to implement the Governors Alternative, a future SIP Call plan, a future Federal Implementation Plan, or the newly crafted EPA Section 126 plan for Ohio.

As I have testified, the only cost-effective way for Hamilton to comply with either EPA's rules or the Governors Alternative is through a NOx allowance trading program that provides easily available, and affordable, NOx credits. Obviously, Hamilton feels that the Governors Alternative is a more reasonable and achievable plan, with its proposal for a 65 percent reduction in NOx emissions. However, even the Governors Alternative is unfavorable to small entities in many respects. For example, it might impose controls on the smallest of utility units, and it does not identify how NOx trading can make compliance achievable for small entities.

Therefore, from Hamilton's perspective, we must have two things to enable us to plan for NOx control: a clear sense of the rules that will apply, and a set of rules that provides for cost-effective NOx trading as a means of compliance. For us, the judicial stay of the SIP Call is merely continuing the uncertainty of our future regulatory obligations, and potentially preventing parties from working together to craft a workable NOx trading program. In the meantime, Hamilton is still awaiting EPA's final Federal NOx trading rule, and the outcome of our discussions with EPA regarding the allowance allocation process under that rule (as I discussed in my written testimony). The final scope and design of any trading program will determine the full impact of the SIP (or FIP or 126) rules on Hamilton. Alternatively, if Ohio implements a Governors Alternative approach, we need to discuss with Ohio EPA the specifics of implementation, such as allowance allocation, trading and compliance deadlines in order to achieve a small entity favorable (or at least neutral) program.

Question 3. If the EPA plan is upheld by the courts, what kind of lead time do you need in order to plan for the reduction?

Response. Since Hamilton's only cost-effective method to comply with the NOx SIP is through the proposed NOx allowance trading program, the lead time necessary for Hamilton compliance may not be as significant as if Hamilton planned to comply through the installation of pollution control equipment or substantial operational changes.

However, the uncertainty that may be associated with a reinstatement of the EPA SIP Call (and its May 2003 compliance date) at the end of the current litigation is a significant concern to Hamilton. I reiterate that Hamilton feels that a phasing of the NOx control program for small entities is justified on both environmental and small entity fairness grounds. Phasing in NOx reduction requirements for the largest sources of emissions first, and then later for small entities, would ensure that the bulk of emission reductions are achieved up front. Further, a phased program will also allow a workable NOx trading program to be fully implemented before small entities become subject to the program. This approach could also broaden the compliance options for small entities: if a new, less-costly NOx reduction technology can be developed during the phase-in period, then a small entity may be able to choose the technology instead of being limited to the trading program as the sole compliance option.

Hamilton would also need lead time for its NOx compliance if U.S. EPA's forthcoming Federal NOx trading program does not grant Hamilton's request that its allowance allocation for Boiler 9 be adjusted to reflect Hamilton's unique circumstances, as explained in my written testimony. If Hamilton is required to meet NOx requirements as early as May, 2003 with a substantial underallocation of NOx allowances, the City will need to consider other options, including the shut down or sale of our fossil-fired electric plant, which could in turn threaten the viability of our system, established in 1893.

Likewise, Hamilton would need lead time to plan, if the State of Ohio implements a NOx control plan that does not provide for easily available, cost-effective NOx allowance trading by Hamilton. Again, without such an option, Hamilton may face a crisis.

In any of these scenarios, Hamilton is harmed by the lack of regulatory certainty of the current situation, which is only exacerbated by the prospect of continuing litigation over the Federal NOx program.

Question 4. The EPA is going forward with Section 126 petitions, at this point they will only address the 1-hour standard, because of the recent NAAQS decision. If they win the appeal, presumably they will re-address the 8-hour standard, plus the SIP Call at a later date, what effect does this have on your city's short- and long-term planning?

Response. The City of Hamilton is struggling with two major issues regarding our electric system as I respond to this question. The first is, can we compete under electric deregulation? Governor Taft signed a bill on June 6, 1999 deregulating the electric utility industry in Ohio effective January 2001. Municipal electric utilities have to right to "opt out" from competition under this deregulation bill. Given the significant debt load under which the Hamilton Electric System is operating due to our decision to invest in hydroelectric power, and the potential disproportionate costs that will be incurred to comply with any regional NOx reduction strategy, our ability to compete is in question. However, with our need to attract and maintain jobs for our community though the provision of low-cost electric service, do we dare not open our city to competition? Thus, the uncertainties associated with the ozone NAAQS, the SIP Call, Section 126 are placing the City in a significant planning quandary, both short and long term.

Hamilton is also concerned with a second issue, which is affected by the uncertainly of the current regulatory situation. Hamilton has decided to delay indefinitely the installation of low NOx burners on Boiler 9, which are necessary for our compliance with Phase 2 NOx reductions requirements under Clean Air Act Title IV. Phase 2 rules applicable to Boiler 9 mandate compliance with a 0.40 lb/mmBtu limit for NOx emissions effective January 1, 2000. The installation of low NOx burners is a cost-effective method of complying with this new limit. Hamilton, however, could not justify investing additional capital dollars in our generating system should deregulation and/or further NOx requirements cause us to go out of business. We will be complying with the Title IV requirements by co-firing natural gas. For the long term, this is not the most cost-effective mode of operation but, given all the uncertainties, no other prudent decision could be made.

RESPONSES BY THOMAS NYE TO ADDITIONAL QUESTIONS FROM SENATOR CHAFEE

Question 1. In your testimony you reference the EPA's proposed NOx Trading program. Could you elaborate on how you think that proposed NOx Trading program could be improved?

Response. For Hamilton and most small public power electric generators, compliance with any regional NOx control strategy must be achieved through the trading and purchase of NOx allowances through a NOx Trading program. Therefore, the trading program must be well conceived and well implemented.

However, any system implemented by EPA under the current regulatory climate could be confusing and counter-productive, especially for small entities. EPA's proposed Federal NOx trading system will not be applied uniformly over the eastern United States, but instead through a hodgepodge of voluntary State programs and Federal mandates. For example, the State of Michigan currently does not plan to participate in any regional NOx trading approach. In Ohio, there is a trading committee currently meeting to determine if Ohio is going to have trading as an option in its rulemaking approach; thus it is unknown if trading will be an option for Hamilton. Likewise, it is not clear at this point whether EPA mandates may be imposed on selected States through SIP Call responses, applications of NOx FIPs to individual States, and/or the application of Section 126 controls to individual sources.

In this confused context, if fewer States choose to participate in a regional NOx trading program, or if the individual State programs are not consistent, it will surely result in an inefficient market with higher cost allowances. For example, Hamilton understands that NOx allowances are currently trading in the $6,000–$7,000 range right now under the Ozone Transport Regional system in New England, which is a smaller market. Moreover, a poorly designed trading program could potentially allow competitors, particularly large utilities with multiple plants, to hoard allowances and further drive up costs for small entities.

For these reasons, Congress should consider establishing the NOx cap-and-trade program for the entire 22 State region involved in the regional NOx reduction strategy to alleviate the confusion and inefficiencies that differing voluntary State, and federally mandated, programs will cause. Such a regional trading system can build upon EPA's proposed Federal NOx trading plan and the successful SO_2 trading program. A legislatively established system should also provide incentives for the early retirement of fossil-fired electric plants, including small plants. Incentives should also be put in place for verifiable, voluntary emissions reductions activities like energy efficiency and investments in green power, including small hydroelectric generation projects like Hamilton's Greenup Locks and Dam facility. The NOx trading system should also provide assistance and incentives to small entities, like public power systems, that are covered by the regulatory program yet burdened by diseconomies of scale and other disadvantages. For example, allowance allocation

formulas can be developed that provide additional credits to smaller entities, or more flexibility in the use of such credits.

Finally, I must again emphasize that even if Congress establishes a NOx trading program as Hamilton and other small entities recommend, it is critical that Hamilton's NOx allowance situation be resolved. Due to our significant investment in hydroelectric generation and unusual circumstances during EPA's chosen baseline utilization years for affected utility sources, Hamilton may be placed at a severe competitive disadvantage in relation to similar units. Thus, any cap-and-trade program must provide a method for the adjustment of baselines for individual units who demonstrate certain unusual circumstances during baseline years, such as extended outages or atypically low utilization.

Question 2. In your testimony you cite environmental improvements that were made to the Hamilton Public Utility made as far back as 1981, including investments in hydro power. What year do you propose to start getting credit for voluntary or mandatory actions that you have already completed?

Response. While Hamilton feels that recognition of our early efforts is appropriate under EPA's NOx trading program, we are not requesting that allowances be provided from day one of the operation of our hydroelectric plant. Nor do we suggest a specific year at which EPA should begin crediting voluntary action by utilities who reduced NOx early, in expectation of potential future requirements. Hamilton does, however, believe that our voluntary emissions reduction activities should be considered with respect to our reasonable request for an adjusted allowance allocation to Hamilton's coal-fired, 50 megawatt Boiler 9. As I have testified, Boiler 9, which is the primary source of back-up generation to Hamilton's hydroelectric plant, experienced unusual and atypically low utilization during the 1995–97 baseline period chosen by EPA for allowance allocations.

We understand that no entities, aside from Hamilton and a handful of Michigan public power communities, have requested adjusted allowance allocations based on unusual circumstances in the proposed EPA baseline period. Hamilton's situation is thus fairly unique. We ask that Hamilton's situation be considered in light of our significant investment in clean hydroelectric power, because our hydroelectric plant is essentially hitched to the same yoke as our affected Boiler 9. Hamilton is not asking for a change in how the overall, regional allocation process occurs, and thus our request should not have any significant effect on EPA's final NOx trading rules or the public health and environment.

RESPONSES BY THOMAS NYE TO ADDITIONAL QUESTIONS FROM SENATOR VOINOVICH

Question 1. What will be the effect of EPA's NOx control strategy and regional trading program on Hamilton's coal plant, as it is now proposed?

Response. As explained in my testimony, the only way Hamilton can cost effectively comply with EPA's proposed strategy is through the purchase of NOx trading allowances. However, the way EPA has proposed allocating those allowances will seriously shortchange Hamilton due to exceptional circumstances at our plant and our decision to invest in hydroelectric generation. We have raised these concerns with EPA, and we are appreciative that they have listened and understood our concerns. However, if EPA does not account for Hamilton's situation in its final NOx trading program, which we expect them to announce on July 15, I can say that the very viability of our Hamilton electric system will be threatened. For a community that has been in the electric generating business since 1893, and that has been progressive in its decisions to protect the environment, it would be truly ironic, and unfair, for this proposed rulemaking to cause us to cease operations.

Question 2. What is Ohio Public Power's overall concern with EPA's NOx control strategy?

Response. Ohio Public Power recognizes that there are local ozone problems that involve short range regional NOx transport (e.g., from Ohio to Pittsburgh). We are committed to working with State regulatory agencies to solve these problems in a cost-effective manner for public power facilities.

However, Ohio Public Power believes that EPA's NOx control strategy will impose cost-prohibitive and unwarranted controls on electric utilities, particularly small public power entities. First, Ohio Public Power does not feel that the reductions called for by EPA's NOx control strategy are warranted by the science. The one-size-fits-all 85 percent reduction requirement ignores OTAG's finding that ozone reduction benefits diminish with distance. Second, EPA's NOx control strategy has not adequately assessed the potential disproportionate costs and impacts on small entities, like public power communities. Nor has the Agency adequately identified how to mitigate such impacts. Such assessment could have taken place if the Agency had

performed required SBREFA analysis and outreach for the SIP Call, as Ohio Public Power believes Congress intended in that 1996 law. It is clear that small electric utilities will bear a disproportionate impact from this SIP Call regulation, as EPA has acknowledged, and as evidenced by the estimated $7,500+ cost per ton of NOx removed for Hamliton Boiler 9.

January 14, 1998

TO: Richard Fleming and Mary Moore
City of Hamilton, Ohio
Department of Public Utilities

FROM: Marie Haney
Associate Director of Research
Center for Economic Education, University of Cincinnati

RE: EPA Economic Impact Analysis
City of Hamilton Electric Power Plant

The economic impact of the proposed new EPA regulations and standards on the City of Hamilton's electric power plant is described in terms of the plant's impact on regional business sales, household earnings, and employment in the 13-county Greater Cincinnati area. This economic impact analysis was performed using the Regional Input Output Modeling System (RIMS II), developed by the Bureau of Economic Analysis at the U.S. Department of Commerce. Data was supplied by the City of Hamilton Department of Economic Development.

The City of Hamilton's Electric Power Plant Generates Business Sales of at Least $2.6 Million in the Greater Cincinnati Region

The City of Hamilton's electric power plant purchased $1.7 million in goods and services from Butler County businesses and contractors in 1997. These local expenditures create a ripple effect of an additional $871,802 in the Greater Cincinnati area, for an impact on business sales of $2.6 million. However, the total business sales impact of the City of Hamilton's electric power plant exceeds $2.6 million to the extent that local expenditures are made beyond Butler County, but still within the 13-county region. Therefore, the City of Hamilton's electric power plant generates business sales of at least $2.6 million in the Greater Cincinnati region.

The City of Hamilton's Electric Power Plant Creates Direct and Indirect Household Earnings of $12.8 Million in the Greater Cincinnati Region

Total payroll and benefits for the City of Hamilton's electric power plant is $4.6 million. These earnings create an additional $5 million in household earnings throughout Greater Cincinnati industries, for a total earnings impact of $9.7 million.

In addition, the City of Hamilton's electric power plant directly pays for the payroll and benefits of related non-utility departments, which we have classified as local government employment. The Plant contributed $1.2 million in payroll and benefit payments to these workers in 1997, which creates a total earnings impact of $3.1 million in the Greater Cincinnati area.

Adding these two household earnings impacts together yield a total earnings impact of $12.8 million.

The City of Hamilton's Electric Power Plant Directly and Indirectly Supports 371 full- and part-time jobs in Greater Cincinnati

The City of Hamilton's electric power plant employs 95 people. These 95 jobs indirectly generate an additional 178 full- and part-time jobs in Greater Cincinnati, for a total employment impact of 273.

The 33 non-utility jobs supported by the Plant indirectly create 65 more full- and part-time jobs in Greater Cincinnati, for a total employment impact of 98.

Adding these two employment impacts together yield a total employment impact of 371 full- and part-time jobs in Greater Cincinnati.

Economic Impact Summary Table

Butler County Expenditures	$ 1,745,000
Indirect Impact on Business Sales	$ 871,802
Total Impact on Business Sales	**$ 2,616,802**
Butler County Payroll and Benefits	$ 5,795,000
Indirect Impact on Household Earnings	$ 7,029,512
Total Impact on Household Earnings	**$ 12,824,512**
Butler County Employment	128
Indirect Impact on Employment	243
Total Impact on Employment	**371**

CITY OF HAMILTON

Department of Public Utilities

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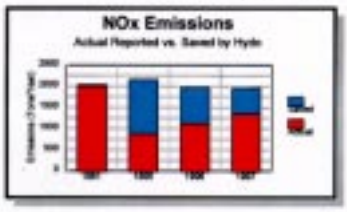
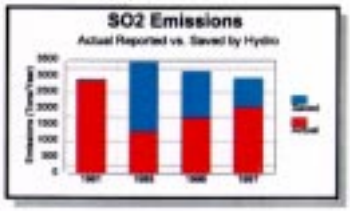
Thomas Nye, O.D. Mayor, City of Hamilton, (513) 868-5834; Fax: (513) 867-7335

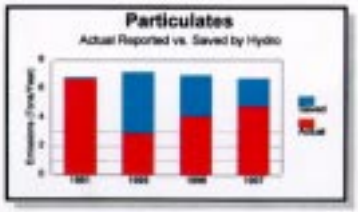
Pollutant Emissions

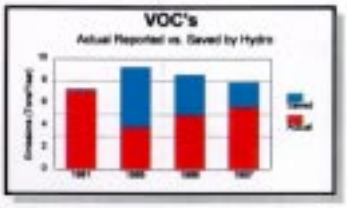




Year	Actual	Saved
	(Tons/Yr)	(Tons/Yr)
1981	2010.00	29.56
1995	879.53	1273.10
1996	1125.85	852.78
1997	1370.9	582.68

Year	Actual	Saved
	(Tons/Yr)	(Tons/Yr)
1981	2874.94	42.26
1995	1292.59	2147.96
1996	1725.07	1438.73
1997	2062.64	888.23





Year	Actual	Saved
	(Tons/Yr)	(Tons/Yr)
1981	6.70	0.10
1995	2.92	4.24
1996	4.12	2.84
1997	4.81	1.94

Year	Actual	Saved
	(Tons/Yr)	(Tons/Yr)
1981	7.18	0.11
1995	3.54	5.40
1996	4.92	3.62
1997	5.65	2.22

1995 - 1997 (baseline years for NO_x SIP)

Pollutant Emissions from fossil fuel generation and emissions saved due to hydroelectric generation for City of Hamilton Department of Public Utilities. 1981 as a baseline to demonstrate emissions prior to purchase of Greenup Hydroelectric Facility.

City of Hamilton

Department of Public Utilities

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Mary Moore, Utilities Environmental Administrator, (513) 868-5907 ext. 1830; Fax (513) 867-7300

NO_x SIP CALL, FIP, Section 126

Hamilton Specific Issues with USEPA NO_x Rulemakings

A. The proposed budget allocation methodology, which is based on actual 1995, 1996 and 1997 heat input to affected boilers, places the City of Hamilton into a situation whereby we may not be able to provide cost effective service to our community.

1. The base line years upon which the NO_x budget has been calculated were unusual years for the operation of Boiler #9.

   a) In 1995, the operational hours of boiler #9 was 77% of the possible ozone season due to a major rehabilitation of the boiler.
   b) In 1996, the availability of boiler #9 was 53% due to boiler control upgrades necessary for a dry desulfurization pollution control project.
   c) In 1997, the availability was only 59% due to a rebuild of the associated generator and final tie-in of the desulfurization project.

2. Our switch to hydroelectric generation made our 1995-1997 heat input baseline artificially low:

   a) Hamilton, in 1981, chose to invest in hydroelectric generation instead of building additional fossil fuel generation. Choosing hydroelectric generation incurred a cost of $29.534 million more than the cost for installing of a similar sized coal-fired boiler. Hamilton is still paying the debt on this.

   b) Hamilton's current generation mix consists of 50% fossil fired and 50% hydroelectric. Hamilton has already cut our NO_x (and all other pollutant) emissions by 50% by switching from fossil fuel generation to hydroelectric generation.

      i) In 1981, the native load requirement was 423,670 MWh; in contrast, during 1995, the native load was 634,883 MWh, an increase of 50% from 1981; however, even with this increase, the utilization of Boiler #9 was 60% of 1981 and the utilization of boiler #8 was 68% of 1981.

      ii) During 1996, the native load was 630,647 MWh, an increase 49% from 1981; however, utilization of boiler #9 was 68% of 1981 and utilization of boiler #8 was 75%.

      iii) For 1997, the native load was 152% of 1981, yet use of boiler #9 was 67% of 1981 while use of boiler #8 was 111% of 1981.

   c) Our hydroelectric generation facilities are located on rivers and production is based on "run of the river" conditions. That is, rainfall has great impact on generation ability: too much rain and generation is shut down due to flooding; too little, and generation is also shut down to keep navigational uses functioning. Therefore, since the generation from our hydroelectric facilities is not guaranteed, Hamilton must be prepared to generate all it's base load needs via fossil generation.

   d) Since the proposed budget allocation is based on historical heat input, and Hamilton had already cut its heat input by 50%, we are projected to receive only 50% of the allocations that Hamilton must have to support our required generation. **Even with the installation of technology to comply with the 0.15 lb/mmBtu limit, if the NO_x budget remains as proposed for Boiler #9 (87 tons per ozone season)**

Hamilton will only be able to run Boiler #9 for 66 days through the ozone season when our demand is highest and when generation from the hydroelectric facilities is not guaranteed.

B. The estimated cost per ton removal for Boiler #9 is $7,554. This is well in excess of USEPA's estimated cost of $1,468/ton removal for large electric generating units. With the advent of electric deregulation, it places Hamilton at a competitive disadvantage to the large investor owned utilities with whom we must compete.

1. In a study conducted by the University of Cincinnati utilizing the Regional Input Output Modeling System (RIMS II), it was determined that the City of Hamilton Power Plant generates business sales of at least $2.6 million in the Greater Cincinnati Region.
2. The Power Plant created direct and indirect household earnings of $12.8 million in the Greater Cincinnati Area.
3. The Power Plant directly and indirectly supports 371 full and part time jobs in the area.
4. The local income tax effect to the City of Hamilton was estimated to range from $115,664 to $159,064.

Possible Remedies for Hamilton

Hamilton has provided comment throughout the rulemaking process regarding the above issues. Four possible methods to ameliorate the unfair budgeting process have been suggested:

1. Make allowances for special circumstances during the baseline years. The heat input used to develop the baseline budget should reflect normal operation, not the unusual downtime that Hamilton faced resultant from the installation of pollution control equipment. We feel that 1998 operations closely approximate the normal operating conditions for Hamilton's boiler #9 and request that 1998 heat rate data for boiler #9 be used to determine Hamilton's baseline and NO_x allowance allocation. This would result in an uncorrected for growth NOx allowance allocation of 134 tons (heat input of 1,781,053.6 mmBtu times 0.15 lb/mmBtu); and

2. Utilize the correct growth factor for Hamilton. From 1982 through 1997 (latest date information is available from our consultant), Hamilton has experienced an average growth of 2.2%. If 1998 is used as our baseline year and the program goes into effect 2003, then there should be a growth factor of 1.11 instead of the 1.07 used in proposed rule. This would result in an allocation of 148 tons for boiler #9; and

3. Granting Hamilton credits for the NO_x emissions "saved" from our hydroelectric generation. In this manner we could generate via fossil fuel generation should the hydroelectric facilities not be able to produce electricity, and receive credit for the more expensive, environmentally friendly generation produced by our hydroelectric facilities. The average generation during the 1995-1997 baseline years for Greenup was 120,586 MWh. To replace that generation with fossil fuel generation with Boiler #9 would result in an additional 1,495,270.5 mmBtu heat input and an additional NOx emission (at 0.15 lb/mmBtu) of 112.1 tons; and

4. Hamilton recommended during our comment submittals throughout the rulemaking process that USEPA "phase in" this rule similar to the Phase 2 of the Acid Rain program. The larger boilers had to comply first (and hence the environment received the bulk of the benefit) and the smaller units had a later compliance date. This later compliance date would allow Hamilton to reap the benefits of "lessons learned" from the installation of the technology on the larger units, and would lessen any price increases caused by large demand on the supply of equipment, technical services contractors and other associated services. This could possibly lessen the cost per ton removal and consequently lessen the competitive disadvantage to which this rule places us.

CITY OF HAMILTON

Department of Public Utilities

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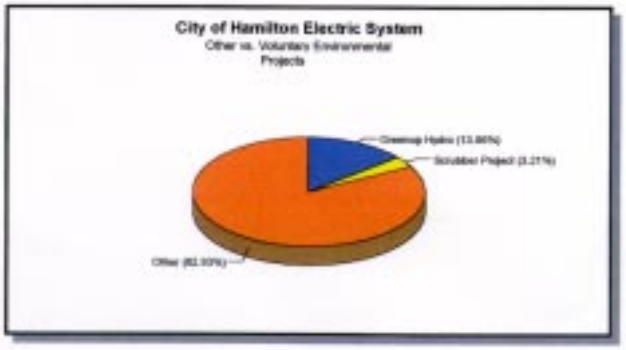
VOLUNTARY ENVIRONMENTAL IMPROVEMENTS DEBT SERVICE



City of Hamilton Electric System Debt

Percent Voluntary Environmental Debt expended vs. Other Capital Debt incurred by the Electric Utility.

- Yearly debt service for all Capital debt totals $14.9 Million
- Yearly debt service on other projects totals $12.33 Million
- Yearly debt service for **Voluntary** Environmental Projects totals $ 2.57 Million or 17.2%

City of Hamilton

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Pollution Control/Prevention Initiatives

The City of Hamilton, over the past two decades has voluntarily entered into a variety of pollution prevention and pollution control projects not required by any environmental rulemaking. These projects all benefited the environment and they all incurred an expense to the City for which our residents and customers are currently paying.

- In 1981, Hamilton chose to invest in a 70 MWe hydroelectric facility (Greenup Hydro located on the Ohio River) at an additional expense of $29.534 million over construction of a 70 MWe coal-fired boiler/generator. Total cost for Greenup was in excess of $170 million.

- In 1994, Hamilton invested more than $5 million in rehabilitating the Hamilton small hydro, which is located on a hydraulic canal to the Great Miami River within the City of Hamilton. This facility is rated at 1.5 MWe.

- Also in 1994, Hamilton voluntarily joined with the Ohio Coal Development Office to construct a demonstration project for a new dry scrubber technology for removal of SO2. The total cost of this project is $11.84 million.

- In the early 1980's Hamilton investigated options for disposing of the biosolids from our wastewater facility. Specific options excluded were incineration and landfilling since these were not considered to be environmentally friendly. Additional capital expense totaling $8 million was expended to build an in-vessel composting facility because of the impact on the environment.

- In 1998, Hamilton applied for and received a Regional Brownfield Grant Award for a Brownfields Redevelopment Initiative. Currently, an advisory council is working to identify, inventory and then prioritize an area of approximately 147.5 acres containing at least 12 old industrial/commercial sites that may contain environmental contamination. Our goal is to cleanup these sites, attract business development on the "cleaned" sites and preserve greenspace.

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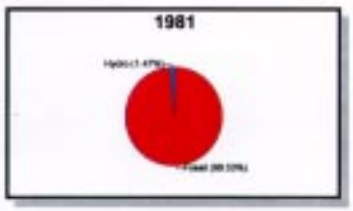
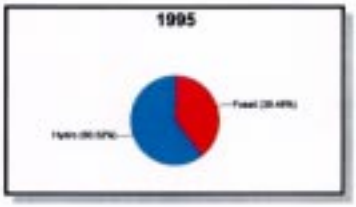
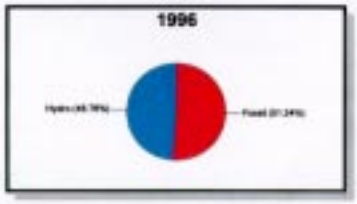
Generation



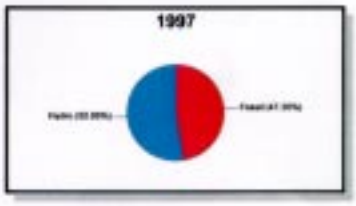
1981 Total Generation 423670 MW h



1995 Total Generation 634883 MW h



1996 Total Generation 630647 MW h



1997 Total Generation 642316 MW h

1995 - 1997 (baseline years for NO_x SIP)

Percent generation of power from the City of Hamilton Fossil Fuel Facility vs. the percent of generation from the City of Hamilton Hydroelectric Facilities. 1981 is provided as a baseline to demonstrate generation prior to purchase of the Greenup Hydroelectric Facility.

OFFICE MEMO

DATE: October 17, 1997

CLIENT: Hamilton, Ohio PROJECT NO.: 9724

SUBJECT: NOx control costs

FROM: Clare Luddy TO: Paul Iott

CC: Tom Fitzpatrick

In reviewing the current literature on the cost of NOx control technology for Hamilton's Boilers No. 7, 8, and 9 and Gas Turbine No. 2 (Westinghouse), we consulted the following publications:

1. At What Cost? An Evaluation of the Proposed 37-State Seasonal NOx Control Program -- Compliance Costs and Issues, November 1995, Energy Ventures Analysis for the Midwest Ozone Group.

2. Assessment of Control Technologies for Reducing Nitrogen Oxide Emissions from Non-Utility Point Sources and Major Area Sources, OTAG Workgroup.

3. Synopsis of the Proposed Rules 3745-14-01, -02, -03, -04, -05 of the Ohio Administrative Code, June 1994, Ohio Environmental Protection Agency, Division of Air Pollution Control.

For comparison to these costs, the Phase I of the Title IV was estimated by the EPA to have an overall cost effectiveness of $227 per ton of NOx removed and the Phase II has an estimated overall cost effectiveness of $229 per ton of NOx removed.

All of the costs from these publications as they apply to the Hamilton units are included on the attached spreadsheets and are summarized here. Not all available technologies were represented in each reference.

Reference No. 3 included data for utility boilers and for industrial, commercial, institutional (ICI) boilers, but only the utility boiler data is represented here. It should be noted that the Hamilton units are generally at the lower size end of the utility boiler category and are, therefore, most likely at the high end of the cost effectiveness for this category.

Reference No. 2 included data only for non-utility type units. This data was only used for Gas Turbine No. 2 since its size puts it in this category. Previously, we had contacted Westinghouse regarding NOx reduction for this unit. They indicated that a combustion based NOx control package for this model was under development and was not yet available.

The following acronyms have been used in the tables that are attached.

ACRONYMS:

BOOS - burners out of service (a form of staged combustion)
CCOFA - close coupled overfire air
DLNB - dry low NOx burners
FGR - flue gas recirculation
LNB - low NOx burners
OFA - overfire air
SCR - selective catalytic reduction
SNCR - selective non-catalytic reduction
SOFA - separate overfire air

Let me know if further information is required.

BOILER NO. 7 - GAS FIRED (CONVERTED FROM COAL)

REFERENCE	NOX REDUCTION	TECHNOLOGY	CAPITAL COST O&M FIXED COST O&M VAR. COST
1	30%	GAS REBURN	$1,240,000 0 Depends on % Derate
1	50%	SNCR	$310 000 $ 25,000/Yr $100,000/Yr
1	80%	SCR	$2,240,000 $ 110,000/Yr $ 80,000/Yr
NOTE: The basis of the O&M costs is 8000 operating hours per year. Costs were prorated for the size of the unit.			

REFERENCE	NOX REDUCTION	TECHNOLOGY	RANGE OF COST EFFECTIVENESS $/TON OF NOX REMOVED
3	36 - 45%	BOOS	230 - 510
3	36 - 55%	FGR	320 - 1000
3	45 - 55%	BOOS + FGR	440 - 850
3	45 - 55%	LNB	750 - 1700
3	64 - 82%	BOOS + FGR + LNB	900 - 2600
NOTE: The basis for cost effectiveness is 8000 operating hours per year. Costs are for gas fired utility boilers, regardless of size.			

The AP-42 emission factor for Gas Fired Boiler No. 7 is 0.55 LB/MMBTU. To reduce this to 0.15 LB/MMBTU, 73% reduction is needed. According to the above tables, Hamilton would need to install SCR or possibly a combination of combustion modifications (BOOS + FGR + LNB) to meet this limit.

BOILER NO. 8 - PULVERIZED COAL FIRED, WALL FIRING, DRY BOTTOM, LOW SULFUR (<2%) COAL

REFERENCE	NOX REDUCTION	TECHNOLOGY	CAPITAL COST O&M FIXED COST O&M VAR. COST
1	40%	COAL REBURN	$2,300,000 $ 115,000/Yr 0
1	50%	GAS REBURN	$1,240,000 0 Depends on % derate and fuel costs
1	50%	SNCR	$450,000 $ 40,000/Yr $160,000/Yr
1	80%	SCR	$4,700,000 $ 235,000/Yr $ 120,000/Yr
NOTE: The basis of the O&M costs is 8000 operating hours per year. Costs are prorated for the size of the unit.			

REFERENCE	NOX REDUCTION	TECHNOLOGY	RANGE OF COST EFFECTIVENESS $/TON OF NOX REMOVED
3	11 - 22%	OFA	410 - 1100
3	33 - 50%	LNB	160 - 450
3	39 - 61%	OFA + LNB	140 - 800
3	44 - 56%	NAT'L GAS REBURN	710 - 1200
NOTE: The basis for cost effectiveness is 8000 operating hours per year. Costs are for coal fired utility boilers, regardless of size			

Based on 0.55 LB/MMBTU and 8000 Hr/Yr operation, this unit would emit 671 tons of NOx per year. 73% of 671 is 490 tons of NOx per year. According to reference 1, SCR capital cost would be $2,240,000 with yearly operating and maintenance of $192,000 for this size unit. According to reference 3 for BOOS + FGR + LNB, yearly cost would range from $441,000 to $1,274,000 for a utility boiler.

The AP-42 emission factor for this boiler is 21.7 Lb/Ton. With a fuel heat content of 12,256 BTU/Lb. the emission is calculated to be 0.9 LB/MMBTU. To get 0.15 LB/MMBTU, Boiler No. 8 would require an 83% reduction in NOx. From the above tables, it is not clear if this is possible. A combination of combustion modifications and SCR would probably be required.

Based on 0.9 LB/MMBTU and 8000 Hr/Yr operation, this unit would emit 1098 tons of NOx per year. 83% of 1098 is 911 tons of NOx per year. According to reference 1, SCR capital cost would be $4,700,000 with yearly operating and maintenance of $355,000 for this size unit.

BOILER NO. 9 - PULVERIZED COAL FIRED, TANGENTIAL FIRING, DRY BOTTOM

REFERENCE	NOX REDUCTION	TECHNOLOGY	CAPITAL COST O&M FIXED COST O&M VAR. COST
1	40%	COAL REBURN	$3,865,000 $ 195,000/Yr 0
1	50%	GAS REBURN	$2,080,000 0 Depends on % Derate and fuel costs
1	50%	SNCR	$810,000 $ 65,000/Yr $320,000/Yr
1	80%	SCR (<2% S COAL)	$7,140,000 $357,000/Yr $240,000/Yr
	80%	SCR (<2% S COAL)	[redacted]

NOTE: The basis of the O&M costs is 8000 operating hours per year. Costs are prorated for the size of the unit.

REFERENCE	NOX REDUCTION	TECHNOLOGY	RANGE OF COST EFFECTIVENESS $/TON OF NOX REMOVED
3	36 - 43%	LNB W/CCOFA	490 - 1140
3	36 - 57%	LNB W/SOFA	420 - 1590
3	50 - 64%	NAT'L GAS REBURN	1110 - 2180
3	30%	LNB	369 - 2864

NOTE: The basis for cost effectiveness is 8000 operating hours per year. Costs are for coal fired utility boilers, regardless of size.

If low NOx burners were not available, water injection would be the next lowest cost. According to Reference 2, water injection cost would range from $994 to $1,271 per ton of NOx removed. This would be a yearly operating cost ranging from $288,300 to $368,600 per year

GAS TURBINE NO. 2 (WESTINGHOUSE)

REFERENCE	NOX REDUCTION	TECHNOLOGY	RANGE OF COST EFFECTIVENESS $/TON OF NOX REMOVED
2	75 - 85%	LOW NOx FUEL (diesel firing)	0 - 2000
2	60 - 90%	LNB	366 - 557
2	70 - 90%	WATER INJECTION	994 - 1271
2	70 - 90%	STEAM INJECTION	1107 - 1417
2	90 - 90%	SCR	1642 - 1850
NOTE: The basis for cost effectiveness is 8000 operating hours per year. Costs are for coal fired utility boilers, regardless of size			

REFERENCE	NOX REDUCTION	TECHNOLOGY	RANGE OF COST EFFECTIVENESS $/TON OF NOX REMOVED
3	to 25 ppmvd	DRY LNB	140 - 3330
3	to 42 ppmvd	STEAM INJECTION	937 - 2080
NOTE: The basis for cost effectiveness is 8000 operating hours per year. Costs are for coal fired utility boilers, regardless of size.			

The AP-42 emission factor for NOx for gas fired gas turbines is 0.44 Lb/MMBTU. To get this reduced to 0.15 LB/MMBTU would require a 66% reduction in NOx Any of the above technologies should be able to meet or exceed this reduction. However, please note that the low NOx fuel is an option for diesel firing only. Also, the manufacturer of this unit, Westinghouse, when contacted about this model number, indicated that low NOx burners were not yet available but were under development.

Based on 0.44 LB/MMBTU and 8000 Hr/Yr operation, this unit would emit 440 tons of NOx per year. 66% of 440 is 290 tons of NOx per year. According to reference 2, low NOx burners cost would range from $366 to $557 per ton of NOx emoved. This would be a yearly operating cost ranging from $106,200 to $161,600 per year.

HAMILTON NOx REDUCTION STUDY
SFT PROJECT NO. 9724

NO ESCALATION FROM 1994 DATA

Jun-94
OEPA DAPC (REF #3)
GAS TURBINES

DRY LOW NOx BURNER	MIN	MAX
UNCONTR OLLED (LB/MMBTU)		
CONTROLLED (PPMVD)	25	25
WALL FIRED		
COST $/TON	57	1060
COST $1000/YR		

STEAM INJECTION	MIN	MAX
UNCONTR OLLED (LB/MMBTU)		
CONTROLLED (PPMVD)	42	42
REDUCTION (LB/HR)		
COST $/TON	937	2080
COST $1000/YR		

WATER INJECTION	MIN	MAX
UNCONTR OLLED (LB/MMBTU)		
CONTROLLED (PPMVD)	42	42
REDUCTION (LB/HR)		
COST $/TON	937	2080
COST $1000/YR		

Jan-97
OTAG WORKGROUP (REF #2)
GAS TURBINE: 16.32 MW
BASIS: 5 MW & 25 MW, INTERP

LOW NOx BURNER	MIN	MAX
POTENTIAL RED. %	90%	60%
CAP COST $1000	832	832
VAR COST $1000/YR	110	110
COST EFF. $/TON	366	557

STEAM INJECTION	MIN	MAX
POTENTIAL RED. %	90%	70%
CAP COST $1000	1219	1219
VAR COST $1000/YR	334	334
COST EFF. $/TON	1107	1417

WATER INJECTION	MIN	MAX
POTENTIAL RED. %	90%	70%
VAR COST $1000/YR	881	881
COST $1000/YR	303	303
COST EFF. $/TON	994	1271

SCR	MIN	MAX
POTENTIAL RED. %	90%	90%
CAP COST $1000	1120	1120
VAR COST $1000/YR	526	526
COST EFF. $/TON	1642	1850

LOW NOx FUEL	MIN	MAX
POTENTIAL RED. %	85%	75%
CAP COST $1000	0	0
VAR COST $1000/YR	0	300
COST EFF. $/TON	0	2000

EPA Cost Analysis

	Unit	Life Expectancy	Expense Year	Remaining Years	Cost: Capital	Cost: Interest	Cost: Total	Cost per Remaining Year	Construction Costs: 95 Original	96	97	98	4.50% Interest Costs
	a	b	c	d	e	f	g	h	Inflation Rate = 3%				
1	8	2013	2003	10	$ 5,160,665	$1,257,452	$ 6,418,118	$ 641,812	$ 4,710,000	$ 4,855,670	$ 5,005,845	$ 5,160,665	$1,257,452
2	7	2005	2003	2	$ 1,355,359	$64,444	$ 1,419,803	$ 709,902	$ 1,237,000	$ 1,275,258	$ 1,314,699	$ 1,355,359	$64,444
3	9	2023	2003	20	$ 10,167,935	$5,270,636	$ 15,438,571	$ 771,929	$ 9,280,000	$ 9,567,010	$ 9,862,897	$ 10,167,935	$5,270,636
					$ 16,683,960	$ 6,592,532	$ 23,276,492						

Unit				Annual Debt Service	O&M Fixed	O&M Variable	Annual Cost
9	2023	2003	20	$ 771,929	$ 465,000	$ 192,100	$ 1,429,029

Attachment 2

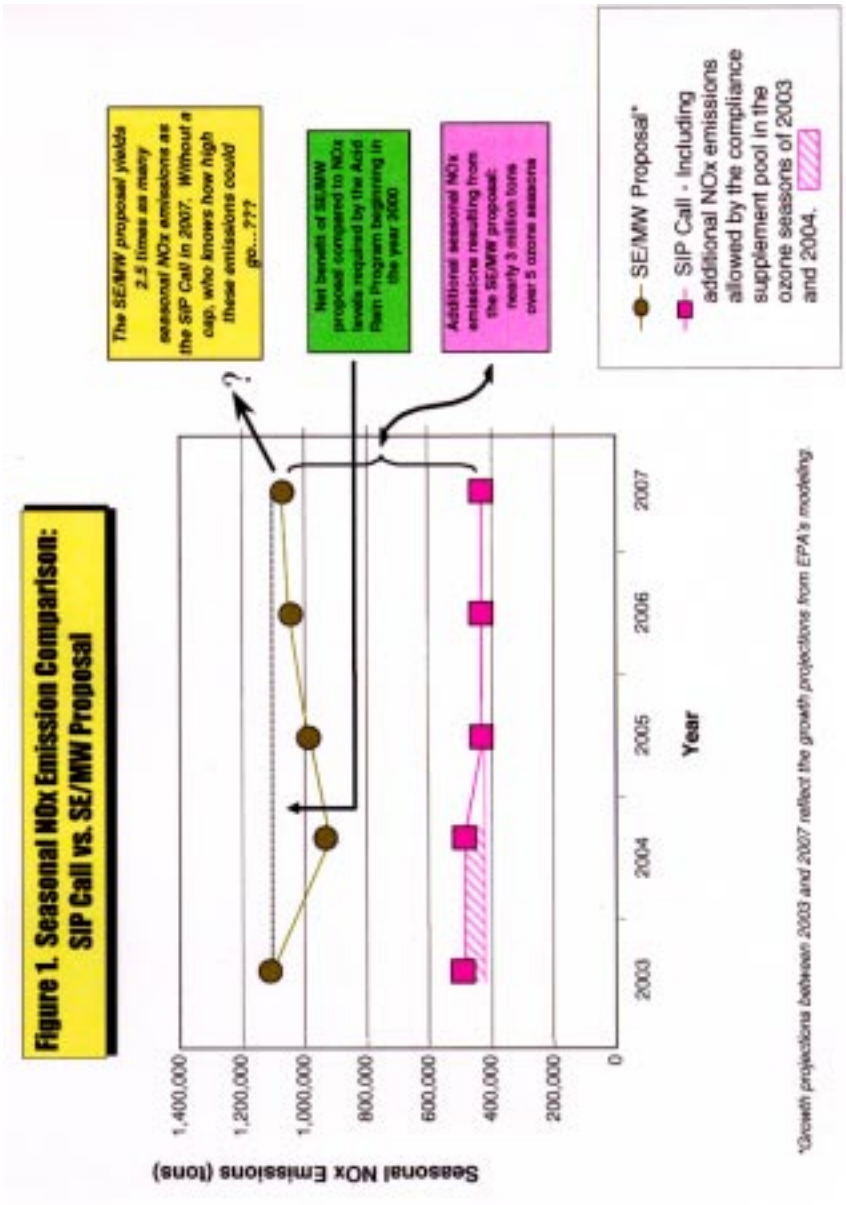


Figure 1. Seasonal NOx Emission Comparison: SIP Call vs. SE/MW Proposal
The SE/MW proposal yields 2.5 times as many seasonal NOx emissions as the SIP Call in 2007. Without a cap, who knows how high these emissions could go...???
Net benefit of SE/MW proposal compared to NOx levels required by the Acid Rain Program beginning in the year 2000
Additional seasonal NOx emissions resulting from the SE/MW proposal: nearly 3 million tons over 5 ozone seasons
SE/MW Proposal*
SIP Call - Including additional NOx emissions allowed by the compliance supplement pool in the ozone seasons of 2003 and 2004.
Seasonal NOx Emissions (tons)
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
2003
2004
2005
2006
2007
Year
*Growth projections between 2003 and 2007 reflect the growth projections from EPA's modeling.

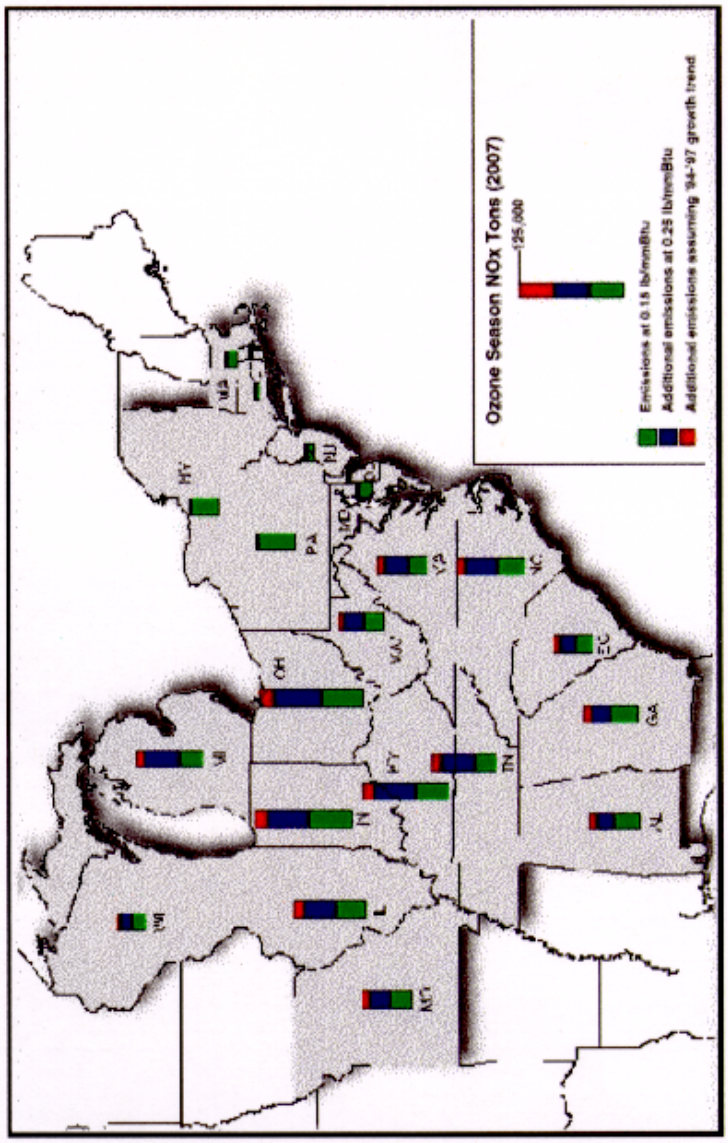


Figure 2. Seasonal NOx Emission Increases, by State, Resulting from Implementing the SE/MW Proposal.

STATEMENT OF F. WAYNE HILL, GWINNETT COUNTY, GEORGIA

Thank you for allowing me to speak today about the Clean Air Act and proposed regulatory changes. My name is F. Wayne Hill, Chairman of the Gwinnett County Board of Commissioners in Lawrenceville, GA, and Chairman of the Atlanta Regional Commission, the metropolitan planning agency for the Atlanta area. I am currently serving my second term as Gannett County Commission Chair. I have lived my entire life in Gwinnett County and built my business there.

In 1960, Gwinnett County had a population of 42,000. Today, our population has swelled to more tom 500,000. More than ever, I understand and agree that standards are necessary to preserve air quality to protect the public health. I'm especially

sympathetic to others who are affected by the region's air quality. While I serve as Chairman of Gwinnett County's Board of Commissioners, my bigger role is that of husband, father and grandfather. Sadly, my granddaughter suffers from upper respiratory problems, and that causes my wife and I a great deal of concern.

On behalf of the residents in Gwinnett County, including my wife, children and other family members, I want to commend you and earlier members of Congress who decided to tackle the problem. Because of you, air quality is better today that it was 25 or 30 years ago.

As I mentioned earlier, I also serve as Chairman on the Atlanta Regional Commission. In that capacity, I have been very involved with Atlanta's efforts to comply with the requirements of the Clean Air Act. I can assure you that both the ARC and Georgia State agencies have been working diligently to ensure compliance in the region.

As we work to address this matter, let's remember that air quality is a very complicated issue, involving a number of interconnected sources. My discussion today will cover three major areas: 1) coordination and consistency at the Federal level, 2) complexity of Clean Air issues and 3) consequences of regulation.

First, let's talk about coordination and consistency. I am very comfortable with Congress's intent on the Clean Air issue. Sometimes, though, your intent may be blurred by how Federal agencies implement your legislation. It's not unusual for two Federal agencies to take different approaches to an issue that can leave a local government hung between two conflicting sets of regulations. Specifically related to the Clean Air Act, we request that Congress emphasize a coordinated approach that balances all the many factors that should be considered, including public health, highway safety, mobility, economic impacts, cost and the will of the American people.

Such coordination can help reduce certainty about future requirements, which is one of the most difficult things for local governments to handle. In Gwinnett and the rest of the Atlanta region, we have been thrown into chaos by a combination of decisions at our level and the Federal level and legal challenges to those decisions.

Federal funding for a number of previously approved projects has been withdrawn. The State of Georgia and local governments like mine are faced with the prospect of worsening congestion and increased danger of travel while we attempt to meet the revised guidance from the Federal level. You can imagine our frustration! While we are told repeatedly that we must plan for the long-term, our plans have to be based on Federal requirements that can change rapidly.

I understand that legislation has been proposed to address the Court decision regarding EPA's rule dealing with "grandfathered" projects. I urge that Senate Bill 1053 be passed for the good of areas all across the United States.

The second point for discussion is the complexity of the issue. All of you know that this is a complicated, interconnected problem. It is easy to create unintended results. For example, there is a lot of discussion about the evils of "sprawl" development and its contribution to air pollution through encouraging auto-dependent travel. Yet dealing with the extra requirements brought on by designation as an area with air quality problems can drive businesses and people to move farther out.

My small business, a cabinet shop, is a point-source for certain pollutants because we use glues and stains. We were sent 30 to 40 pages of papers to file about the number of gallons we use. If we were three miles to the north, we would be in a county that is outside the non-conforming Atlanta area, and we would not have to file these documents. Some businesses will supply choose at some point to move rather than deal with the extra regulations. As companies move further, so will people, resulting in more and more sprawl of development.

Third, I want to touch on the consequences of regulation. As noted earlier, Federal funding for certain transportation projects in the Atlanta area has been withdrawn. This leaves many local governments, including Gwinnett, with gaps in the transportation network, for example, two-lane road sections connecting four-lane sections.

Delaying such projects puts the public at risk. Not only is there increased likelihood of vehicle accidents but the response time of emergency vehicles climbs. Greater congestion also leads to exactly what we're trying to prevent—emission of more pollutants!

We must also consider the public's will. Gwinnett County voters approved a one-cent special purpose local option sales tax for the purpose of improving the transportation infrastructure. It's tough to explain why we cannot utilize tax dollars as the public wishes.

Another consequence is the potential effect on the nation's economy. At some point, the uncertainly of future transportation improvements, the impacts of increased congestion on the public and the burden of additional legislation will cause

the business activity of Atlanta to shift and slow. The same will be true for any area in the United States facing non-conformity under Clean Air standards.

Vital to economic development is the ability for industry to get its product to market. If road projects are discontinued, that will virtually shut down Atlanta's transportation network. Industries all over the Southeast rely on our interstate and rail systems and the close proximity to Hartsfield International Airport. If that network is crippled because of delayed or canceled road projects, it could conceivably paralyze the economy for the southeast region. Of equal concern is the perception of businesses considering relocations or expansions. Executives know that it is less expensive for a business to locate in an attainment area than a non-attainment area.

I'm not suggesting that we slow efforts to improve air quality, but that we carefully consider the economic impacts. My business background taught me that I have to have enough money to pay the bills. My time as an elected official has shown me that it takes money to run an effective government, and a healthy economy lets us accomplish important projects that we could not otherwise do. This applies at all levels of government, as you all know better than I do.

In summary, I agree that regulations are necessary to address air quality. I commend the committee and subcommittee members for addressing a complex and unpopular issue. Thank you for your time today and for allowing me to voice my thoughts and suggestions.

RESPONSES BY F. WAYNE HILL TO ADDITIONAL QUESTION FROM SENATOR INHOFE

Question. What advantages and disadvantages do you believe that the "Governors' proposal" on NOx reductions, as alluded to in the hearing, would have relative to EPA's proposed NOx SIP call?

Response. The overall purpose of EPA's September 24, 1998 Final Rule, "Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone" (known as the NOx SIP Call), is to reduce regional transport of NOx that contributes to ozone nonattainment in multiple eastern States. Ground-level ozone tends to be a problem over broad regional areas, particularly in the eastern United States, where it is transported by the wind. When emitted, NOx reacts in the atmosphere to form compounds that contribute to the formation of ozone. These compounds, as well as ozone itself, can travel hundreds of miles across State boundaries to affect public health in areas far from the source of the pollution. Thus, cities or areas with "clean" air, those that meet or attain the national air quality standards for ozone, may be contributing to a downwind city's ozone problem because of transport.

EPA's rule requires 22 States (including Georgia) and the District of Columbia to submit State Implementation Plans (SIPs) that address how they will reduce the transport of NOx emissions across State boundaries. These areas were identified by the EPA as "contributing significantly" to ozone problems in downwind areas. The rule requires emission reduction measures to be in place by May 1, 2003. By improving air quality and reducing emissions of nitrogen oxides, the actions directed by these SIPs will decrease the transport of ozone across State boundaries in the eastern half of the United States, thus assisting downwind States in meeting the ozone standard.

The Atlanta metro area, for example, will not meet the 1-hour standard in 1999 (the attainment deadline for Serious areas) partly because of the impact of pollution entering Georgia from several upwind States, including Alabama, Kentucky, North Carolina, South Carolina, and Tennessee. Consequently, Georgia will request an extension of Atlanta's attainment date to 2003, when controls on those upwind States are required by the NOx SIP Call and other local controls can be in place. Thus, full implementation of the control measures required by the NOx SIP Call in upwind States is very important to Atlanta's achievement of the ozone standard.

Full implementation of the NOx SIP Call, as amended on May 6, 1999, will reduce total NOx emissions by about 25 percent (or 1.142 million tons). EPA projects that these regional reductions will bring the vast majority of all new ozone nonattainment areas into attainment with the 8-hour standard without having to implement local controls.

EPA's rule established NOx budgets for each State by determining the amount of NOx emissions that would remain after application of highly cost-effective controls to utilities and other sources of NOx. For utilities, EPA chose a control level (0.15 lb/mmBtu) which is achievable using available, cost-effective technology. This equates to an 85 percent reduction in emissions from these sources. For non-utility sources, EPA chose a control level that represents a 60 percent reduction from un-

controlled levels for large industrial boilers and turbines, a 90 percent reduction from stationary combustion engines, and a 30 percent reduction from cement kilns. States will be able to decide the best mix of controls to meet their overall NOx budget. However, utilities and large non-utility point sources would be one of the most likely sources of NOx emissions reductions.

The rule also creates a pool of emission "credits" for each State to use. This pool of credits encourages early compliance and also provides flexibility by allowing these credits to be used by sources that might not otherwise meet the deadline. In addition, States can choose to participate in a multi-state "cap and trade" program that allows facilities that reduce emissions early or in greater amounts than required to sell their emissions reductions to other facilities that cannot reduce emissions as quickly or cost-effectively. According to EPA, the "cap and trade" program will allow States to achieve over 90 percent of the emissions reductions required by the SIP call.

During the comment period on the proposed NOx SIP Call in 1998, several States requested that the EPA consider an alternative proposal, called the "Alternative Proposal by the Southeast/ Midwest Governors' Ozone Coalition." This "Governors' proposal" suggests a two-phase approach over a slightly longer implementation period.

As a first step, it calls for a 55 percent (or 0.35 lb/mmBtu) reduction from utility sources by May 1, 2002. In Step Two, the proposal calls for a 60 percent (or 0.25 lb/mmBtu) reduction by May 1, 2004. Controls on non-utility sources would not be required until Step Two. In addition, the proposal calls for considering further reductions that would be needed to attain the 8-hour standard in Step Two. This proposal does not establish emission budgets (or caps), only emission reduction rates.

Compared with EPA's final rule, this proposal would allow States more time to implement control measures. It also calls for less emissions reductions than the final rule. As a result, there may be economic advantages, such as less extensive (and less costly) scrubber systems for utility plants.

It is not clear whether the States involved are suggesting that the Governors' proposal apply to only the States supporting the proposal or to all 22 States and the District of Columbia. If it were applied to a limited number of States, areas with 1-hour standard attainment deadlines of 2003 may not be able to demonstrate attainment if less emissions reductions are achieved in upwind States by then.

Even if the proposal were applied to all 22 States and the District of Columbia, it achieves less total reductions than EPA's final rule and spreads the reductions out over a longer period of time. It does, however, propose considering further reductions to meet the 8-hour standard in Step Two. Nonetheless, downwind States may still be required to implement additional local controls to make up the difference in order to attain the 1-hour standard, and attainment of the 8-hour standard could be delayed.

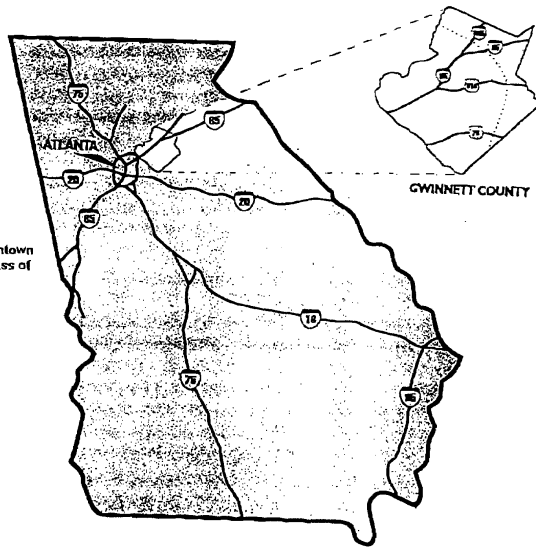
Finally, the proposal does not require the establishment of State emission budgets, only reduction rates. This makes it possible for power facilities in Ozone Transport Commission States (in the northeast) that already have emissions caps to shift their power production to facilities in the midwest, thereby continuing to increase emissions in the midwest.

Attachment C

GWINNETT COUNTY, GEORGIA
INTRODUCTION

Gwinnett County, created by Georgia legislature in 1818, was named for Button Gwinnett who was one of Georgia's signers of the Declaration of Independence and served as governor from 1777 to 1781. Lawrenceville, Gwinnett's oldest city, was officially designated as the county seat in 1821. In the late 1800's, Buford, Duluth, Norcross and Suwanee were being developed as railroad towns, and in the early 1900's over 75% of Gwinnett's population were farmers.

Once a rural county of farms and dirt roads, Gwinnett has prospered into one of the fastest growing regions in the metro area. With a quality of life that boasts of a stable economy and good neighborhoods, citizens are proud to call Gwinnett County home.



With it's border 25 miles from downtown Atlanta, Gwinnett covers a land mass of 437 square miles.

Gwinnett's climate has an average temperature of 61°F with January's temperature 45°F and July's 79°F. The average rainfall amount is 47" and snowfall is 1". Winds prevail from the northwest at a speed of 9.1 mph.

In the 1980's, Gwinnett County's growth soared and continues today. Both residential and commercial development continue to increase and attract individuals, families and businesses from around the globe. Gwinnett's population increased from 167,000 in 1980 to over 500,000 today. Gwinnett County's population, covering 277,032 acres, has grown at a rate of more than 561 percent since 1970.

GWINNETT COUNTY, GEORGIA
INTRODUCTION

GWINNETT COUNTY'S MAJOR EMPLOYERS	
1. Gwinnett County Public Schools (11,239 employees)	6. CIBA-Vision Corporation (1,600 employees)
2. Lucent Technologies (3,500 employees)	7. Primerica Financial Services (1,550 employees)
3. Scientific Atlanta, Inc. (3,375 employees)	8. Motorola Energy Products Division (1,400 employees)
4. Gwinnett County Government (3,091 employees)	9. IKON Office Solutions (1,300 employees)
5. PROMINA Gwinnett Health Systems (2,400 employees)	10. Boeing North America (1,200 employees)
(Source: Gwinnett Chamber of Commerce, 1998)	

Gwinnett County has become a diverse mixture of businesses and industries with some 270 international firms, over 700 manufacturing firms, and more than 480 high-tech firms. With over 20,000 businesses in the county, Gwinnett employs over 235,000 people a month.

Gwinnett's unemployment rate was 2.8% in May 1997 compared to the state average of 4.6% and the national average of 5.2%.

Gwinnett County Government is one of twelve counties nationwide to attain a AAA bond rating by Standard & Poor's, Moody's and Fitch's bond rating agencies. This rating is a result of sound management and financial strength and will support a continual growth in the business community.

Gwinnett County's Airport, Briscoe Field, is the third busiest airport in the state. Briscoe Field is equipped with an instrument landing system, 4,000 and 6,000 foot runways and it serves corporate and private aircraft.

Gwinnett's housing market offers homes from below $100,000 to above $1,000,000 and the average home is priced at $150,000. Of Gwinnett's 184,425 households, 75% have incomes of $35,000 with the median being $73,000. Sales tax in Gwinnett County is six percent and living expenses are lower than the metro area.

In the 1998-99 school year, over 97,000 students were enrolled in kindergarten through 12th grade. Gwinnett County Public School System is the largest in Georgia with 77 public schools. The average student/teacher ratio is 28:1 and Gwinnett's SAT scores exceed Georgia and the national averages.

Attachment D

Background Information
Clean Air Act and the Atlanta Region

Background

- The Clean Air Act of 1990
  - Goal to improve air quality in the United States
  - Sets limits on how much pollutant can be in the air anywhere in the U. S.
  - Designates the state's responsibility in carrying out the Act

- **Attainment** – The Atlanta Region is a **nonattainment area** – i.e., the State (EPD) has been unable to demonstrate attainment with the air quality limits (budget) set for the State by the EPA
  - State Implementation Plan (SIP)
    - Developed by Environmental Protection Division
    - Describes how region will reach attainment
    - Addresses three major types of air pollution
      - Mobile
      - Stationary sources
      - Area sources
    - Dynamic plan that must be revised by certain dates. Typical revisions include:
      - Emissions inventories
      - Demonstrations of progress
      - Attainment demonstrations
      - Maintenance plans

- **Conformity** – The Atlanta Region has been **unable to demonstrate conformity** with the air emissions mobile source budget established by the State (EPD) – i.e., the ARC has been unable to develop a long range transportation plan and short range transportation implementation program that conform to set limits.

  - Vehicle emissions major contributor of 3 pollutants
    - Ozone (NOx + HC + sunlight – CAA focuses on controlling NOx and HC)
    - CO – 90% from motor vehicles
    - PM10 – diesel vehicles significant source

Regional Impacts due to Nonattainment/Non-Conformity

- **Health**
  - Causes respiratory problems – especially in children and elderly
  - Can cause lung function impairment, chest pains, shortness of breath, sore throat, permanent lung damage

- **Land Use**

  - Like most metro area in the county, the rate of land consumption to development is growing much faster than the population in the Atlanta Region. This has created development patterns that are car dependent. Different development patterns are an anathema to the public. Generally, they see "mixed-use" as a chicken house next door, and think of "high-density" as cheap apartments. We have a MAJOR education problem on our hands, nationally.

- **Economic**
  - Atlanta pictured as the "Urban Sprawl Poster Child"
  - Considerations when locating both residential and commercial
    - Congestion and air quality
    - Moratorium on transportation infrastructure expansions

- **Transportation**
  - Only exempt transportation projects and Transportation Control Measures can proceed under current situation
    - Projects currently being pursued as TCMs could potentially be programmed in a conforming RTP/TIP without the stringent financial assurances, analysis and monitoring plans required as a TCM
  - Loss of federal transportation funding to other regions of the state

- **Confusion**
  - Few communications links between federal agencies (EPA and US DOT). Sometimes get conflicting messages at the regional level and don't have any place to turn for mediated answers. Often answers to clarification questions take longer to receive than the schedule can allow.

ARC

Timeline – Regional Transportation Plan (RTP) Development

May 26, 1999	**ARC Board adopted resolution providing guidance for RTP Scenario development** • **Policies to be followed** • **Major transportation systems to be evaluated**
June 6	EPD released draft State Implementation Plan (SIP) for public comment
June 16	EPD public meeting on the SIP
June 23	**ARC Board to adopt Interim Transportation Improvement Program for FY 2000-2002**
June to September	**Development and evaluation of the RTP Scenario**
July 7	EPD public hearing on the SIP / Public comments due
July to August	EPD to receive comments on the SIP and proposed mobile budget
September 9	EPD second public hearing on the SIP
September 30	EPD to submit SIP to EPA
October	**Draft RTP will be available**
January 1, 2000	EPA completes adequacy determination on EPD's SIP
January to February	**Formal RTP released for public comment period**
March	**ARC Board to adopt Conforming RTP**

Discussion of Grandfathered Projects
Gwinnett County, Georgia

ATTACHMENT E

- We have been asked by Federal Highway Administration to prepare a report for them to send to USEPA (Ann Arbor, Michigan) concerning the effect of "segmented" projects in the Atlanta area. Segmented projects include those Grandfathered projects or other continuation projects for which portions of an overall project are either constructed or let to construction contract. Specifically, those for which FhwA requested data in Gwinnett County are:

  1. State Route 124 - Five Construction Phases (Two Bridge and Three Roadway Phases) - Beginning at Pleasant Hill Road in Dekalb County and Continuing to Henry Clower Boulevard in Gwinnett County

     Total Project Length - approx. 10.5 miles

     (Four of the five phases are let to construction contracts - Right-of-way is either acquired or offers have been made on entire project - Phase from Centerville-Rosebud Road to Henry Clower Boulevard in Gwinnett County is the remaining phase - as a grandfathered project, therefore, this phase cannot presently move to construction, leaving this a two-lane unimproved road section)

     This Phase Length - approx. 3.7 miles

  2. Interstate 85 Collector/Distributor System - Four Construction Phases - Beginning Just North of the I-85/S.R. 316 Interchange and Continuing to Just North of the Old Peachtree Road Interchange (all in Gwinnett County)

     Total Project Length - approx. 3.3 miles

     (Three of the Four Phases are let to construction or are completed. Right-of-way is either acquired or offers have been made on entire project - Phase through the Old Peachtree Road Interchange is the only remaining phase - as a grandfathered project, therefore, this phase cannot presently move to construction - additionally, county and state funded road improvements on Old Peachtree Road, both east and west of I-85, have constructed four lane sections that are presently connected by a two-lane bridge across I-85, leading to traffic safety and congestion problems at the Interchange)

     This Phase Length - approx. 1.1 miles

  Additionally, we feel that a similar situation exists with another grandfathered project:

  3. State Route 120 - Four Construction Phases - Beginning at the Lawrenceville City Square and Continuing to just west of its Intersection with Satellite Boulevard

     Total Project Length - approx. 6.6 miles

     (Three of the four phases are either complete or let to construction contracts - Right-of-way is either acquired or offers have been made on entire project - Phase from Riverside Parkway to Sugarloaf Parkway is remaining phase - as a grandfathered project, therefore, this phase cannot presently move to construction, leaving this a two-lane unimproved road section)

     This Phase Length - approx. 2.2 miles

- We feel that the inability to complete the above-referenced projects creates several concerns for the citizens of Gwinnett County:

1. Public Safety Concerns

Obviously, these segments were originally constructed during a time when traffic volumes were substantially less that those of today. Most of the horizontal and vertical alignment is unchanged over the past 40 years. (Interstate 85 traffic volume in 1962 was less than 10,000 vehicles per day. In 1997, the volume was more than 150,000. State Route 124 volume in 1962 was less than 100 vehicles per day. In 1997, the volume was more than 19,000 vehicles per day. State Route 120 traffic volume in 1962 was around 5,000 vehicles per day. In 1997, the volume was around 19,000 vehicles per day.)

Road design and construction techniques were also far less technologically advanced, thus creating conditions under which existing horizontal and vertical curvature, coupled with the incremental increases in traffic volume referenced above, can create many potential sight distance conflicts, thereby increasing the likelihood of traffic accidents. The inability to move forward on these projects that improve traffic safety, therefore, is a major concern.

2. Local Planning and Budgeting Concerns

It has been very frustrating over the past few years to adequately plan and budget for roadway improvements in the light of constantly changing interpretations and directives from the federal agencies. In November of 1996, the citizens of Gwinnett County approved a Special Purpose Local Option Sales Tax (SPLOST) for Capital Improvements for a maximum revenue generation of $440 Million over a four year period, up to $320 Million of which can be used for Transportation Improvements. The Board of Commissioners established the framework for a self-selected Citizens Project Selection Committee (CPSC), consisting of eight members and eight alternates to recommend prioritization of projects for the 1997 SPLOST Program.

Not long after the formation of the CPSC, it became apparent that the Atlanta Region would be in a non-conforming status regarding Transportation Planning for several years. The Atlanta Regional Commission's (ARC) planning staff, in conjunction with staff of the FhwA, the Federal Transit Authority (FTA), the Environmental Protection Agency (EPA), the Georgia Department of Transportation (GDOT), the Georgia Environmental Protection Division (EPD) and the local governments of the region, received interpretations of the "Grandfathering" provisions of the Clean Air Act. These interpretations set forth what we considered a procedure by which all of the potentially grandfathered projects would be scrutinized to determine which could be included in the region's Interim Transportation Improvement Program (ITIP).

As you are aware, 61projects in the region were initially determined to have met the requirements as delineated in the above-referenced procedure and were included in the 1998 ITIP. Seven of these are located in Gwinnett County. All or parts of three of these have been let to construction contract. These projects are not affected by this week's settlement of litigation filed by three environmental organizations against the grandfathering process. However, the remainder has now been placed on indefinite hold. I am sure that you can relate to our frustration in the fact that we feel as if all the applicable rules were followed from the beginning, and now 50 percent of the projects that we felt we could rely upon cannot be advanced.

This gives us great concern from a budgetary as well as a planning standpoint. It is our policy to prepare a six-year Capital Budget. Obviously, there are several unknown factors in the transportation equation that must be considered. Should these projects not be able to be advanced over the next few years, a number of local projects that could alleviate the traffic safety and congestion concerns mentioned above must be planned and budgeted. If these projects are included in a Regional Transportation Plan and TIP in 2000, a totally different set of local priorities may need to be established.

Dollar Amounts Spent on Grandfathered Projects:
Preliminary engineering was authorized on all these projects prior to their becoming grandfathered. This information reflects the status of the projects as of the December 1998 Interim Transportation Improvement Program (ITIP).

- PIB from Rogers Bridge to SR 20:
  The ITIP construction budget for the project is approximately $18 million. This amount has since been authorized. Gwinnett County has budgeted $12.5 million of its funds. Of that amount, $6.7 million has been expensed.

- Old Peachtree Road Bridge @ I-85
  The ITIP contains budgets of $4.6 million for right of way and $19.6 million for construction. Gwinnett has budgeted $628,000. Of that amount, $404,000 has been expensed.

- SR 120
  Construction funds of $6 million are shown in the ITIP. Gwinnett County has budgeted $5.4 million. Of this, $4.3 million has been expensed. The State is to reimburse us for $5 million. Approximately $2.7 million had been reimbursed as of 5/17/99.

Total Gwinnett County funds budgeted for Grandfathered Projects: $18.5 million.
Total Gwinnett County funds expensed for Grandfathered Projects: $11.4 million

Budget Amounts for Grandfathered Projects Without Gwinnett County Participation

- SR 20 has a total of $11.3 million budgeted in the Interim Transportation Improvement Program and Interim Regional Transportation Plan for right of way and construction.

- The expansion of the I-985 and SR 20 interchange has $2.7 million budgeted in the ITIP for construction. Right of way acquisition in the amount of $1.9 million were authorized prior to the January 1998 ITIP. The construction funds were authorized prior to the July 1998 ITIP.

- Buford Highway has $2.76 million budgeted for construction in the ITIP.

- The ITIP contains $23.5 million total in construction funds for the widening of SR 124.

STATEMENT OF JANE STAHL, CONNECTICUT DEPARTMENT OF ENVIRONMENTAL PROTECTION

Introduction

Good morning. My name is Jane Stahl. I am the Deputy Commissioner for Air, Water and Waste Programs at the Connecticut Department of Environmental Protection. I appreciate the opportunity to present the perspective of the State of Connecticut on EPA's NOx SIP Call rule.

As you know, the NOx SIP Call would require 22 States and the District of Columbia to amend their respective State Implementation Plans to reduce emissions of oxides of nitrogen (NOx—a precursor pollutant to the formation of ground-level ozone). These reductions would be achieved through the implementation of a regional, market-based, emissions allowance trading program. Such a program would yield emission reductions more cost effectively than a program based on traditional command and control measures.

The State of Connecticut has been deeply involved in the search for a regional, consensus-based, solution to the problem of interstate transport of ozone. The State of Connecticut, as a member of the Ozone Transport Commission, participated in the Ozone Transport Assessment Group (OTAG) from its inception and fully supports the development of market based approaches to air quality management. We are, however, disappointed by recent events that threaten the promise of cleaner air for all.

To inject a sense of immediacy into this discussion, I would like to point out that so far this ozone season (the period from May 1-September 30 when ambient ozone levels are of greatest public health concern) the State of Connecticut has experienced three (3) days with exceedances of the 1-hour health-based National Ambient Air Quality Standard for ozone (1-hour ozone NAAQS) and eight (8) days with exceedances of the more protective (yet unenforceable) 8-hour ozone NAAQS. The peak 1-hour ozone levels in Connecticut have reached 158 ppb; that is 27 percent higher than the minimum threshold determined by the United States Environmental Protection Agency (EPA) as necessary to protect public health. The peak 8-hour ozone levels in Connecticut have reached 133 ppb, that is 58 percent above the public health threshold set by EPA.

BACKGROUND

I. Connecticut fails to meet the 1-hour ozone NAAQS

The State of Connecticut has been engaged in a prolonged struggle to protect the public health of its citizens by bringing ground level ozone concentrations down to levels which comply with the 1-hour ozone NAAQS. The State of Connecticut has taken great strides to control the primary pollutants that produce ozone by meeting (and often exceeding) the numerous requirements imposed on the State by the Clean Air Act Amendments of 1990 (Act). For example, the Department of Environmental Protection (CTDEP) is currently implementing and plans to implement many aggressive ozone abatement programs, including:

- Reformulated gasoline (including ozone season reid vapor pressure limits) statewide;
- Enhanced Centralized Motor Vehicle Inspection and Maintenance statewide;
- Stages I and II Gasoline Vapor Recovery statewide;
- New Source Review (with Offset requirements) at reduced major source thresholds as low as 25 tons per year (and in some instances technology review at 5 tons per year);
- Reasonably Available Control Technology on NOx Stationary Sources;
- Reasonably Available Control Technology on VOC Stationary Sources;
- California Low Emission Vehicle Program (Cal LEV) with National LEV Compliance Option; and
- OTC NOx Budget Program (1999 Phase II reductions and 2003 Phase III reductions).

Despite the vast improvement in Connecticut's air quality as a result of the implementation of these programs, Connecticut remains in noncompliance with the 1-hour ozone NAAQS established by the EPA. The chief cause of such continued noncompliance with the 1-hour ozone NAAQS is the overwhelming transport of ozone and its precursors, primarily NOx, into our State from upwind States.

There are two maps attached to this testimony which clearly demonstrate the geographic link between high ozone levels and NOx emissions from electricity generating plants:

Figure 1 is a map of average maximum daily ozone (in parts per billion, 1-hour average) measured at ozone monitoring sites in the Eastern United States during the months June through August, 1991–1995. You will note that the most persistently high ozone levels extend along two axes: one is from the lower Ohio River Valley eastward across the Appalachians to Connecticut; and the second extends northeastward from the Piedmont of North Carolina to Connecticut. A third broad area of high ozone exists in the vicinity of Atlanta.

Figure 2 displays two types of information. The red arrows indicate wind flow (direction and persistence) during periods of high ozone episodes; and the circles represent locations and magnitude of NOx emissions from electric generating stations. Note the size of the circles is proportional to the quantity of emissions from each power plant; and that there are a series of power plants along the Ohio River Valley and along the Piedmont closely paralleling the high ozone map.

It is quite obvious that Connecticut is at a distinctive geographic disadvantage in the struggle to lower ozone levels unless we can get upwind areas to assist with reducing ozone precursor emissions.

II. Decisive Federal Action Is Necessary to Address Interstate Transport of Ozone

Air quality monitoring data, collected since the 1970's, shows a significant contribution of ozone in the Northeast originating from pollution sources outside the region. Transported ozone entering the Northeast Corridor has been measured aloft by aircraft at levels exceeding 80 percent of the 1-hour ozone NAAQS (and over 100 percent of the unenforceable 8-hour ozone NAAQS). Reaching attainment in Connecticut and throughout the Northeast is unlikely if States must first compensate

for the polluted air blowing across their boundaries. This is not one State's attempt to lay blame for its poor air quality on another State. Nor is it a choice between reductions from upwind sources or additional reductions from sources in Connecticut and throughout the Northeast. This is specific recognition of the fact that ozone pollution is a regional problem requiring regional solutions. Simply put, we do not live in a vacuum and our actions affect others.

The issue of interstate transport of ozone and its precursors has not gone unnoticed by Congress, who in structuring sections 110 and 176A of the Clean Air Act recognize that constitutional limitations prevent individual States from addressing problems associated with interstate transport of air pollution. There are distinct economies of scale in regional approaches to air pollution control that offer the most flexible opportunities to meet the ozone NAAQS at the lowest possible cost. However in the absence of federal leadership to control interstate transport of air pollution, States such as Connecticut will be constrained to seek relief under section 126 of the Act from transported air pollution which contributes significantly to nonattainment of the 1-hour ozone NAAQS in Connecticut. I would like to be clear that Connecticut's 126 petition is not the preferred option to address ozone transport and that the State of Connecticut would rather participate in a program based on a regional consensus-built solution to this problem. Although I believe that Connecticut's section 126 petition is meritorious and would yield reductions in interstate transport of air pollution, it will do so in a manner that is ultimately wasteful of the resources of all involved parties given the resultant litigation.

III. What the NOx SIP Call Means to the State of Connecticut

The State of Connecticut is fully aware that there are political and industrial interests aligned against the NOx SIP Call. There is also a judicial review of the NOx SIP Call pending before the United States Court of Appeals for the District of Columbia Circuit. The NOx SIP Call faces an uncertain future.

Regardless of the future of the NOx SIP Call, this does not change the fact that Connecticut suffers from some of the worst air quality in the nation. When the CTDEP is forced to issue warnings for its children and elderly citizens to stay inside on sunny summer days, when incidences of hospital admissions for asthma and related respiratory illnesses increase on days with poor air quality, when all of this persists in the face of one of the nation's premier air quality programs, it is obvious that it is beyond the power of the State, acting alone, to correct. This situation is shared by our sister States in the Northeast.

Against this backdrop, Connecticut emphatically endorses EPA's attempt to effectuate Congress' recognition of the regional nature of the ozone problem and offers the following comments in support of the NOx SIP Call:

A. The NOx SIP Call is necessary to protect the public health of Connecticut's Citizens

There are indications of the existence of sensitive subpopulations which are affected by environmental pollutants such as ozone. Ozone-related health effects can include: moderate to large decreases in lung function (e.g. resulting in difficulty breathing and shortness of breathe); respiratory symptoms such as those associated with chronic bronchitis (e.g. aggravated/prolonged coughing and chest pain); increased respiratory problems (e.g. aggravation of asthma and susceptibility to respiratory infection—resulting in increased hospital admissions and emergency room visits); and chronic inflammation and irreversible structural changes in the lungs upon repeated exposures.

Connecticut's Ozone Attainment Plan relies on the NOx SIP Call, in conjunction with the control measures identified in Part I of this testimony and elsewhere in the Connecticut State Implementation Plan, to meet the 1-hour ozone NAAQS. Compliance with the 1-hour ozone NAAQS will only minimize, not eliminate, the adverse health effects described above because many sensitive subpopulations may be adversely effected by ozone levels below the 1-hour ozone NAAQS. Air quality modeling indicates that peak ozone levels will barely comply with the 1-hour NAAQS in the year 2007 ONLY IF the NOx SIP Call, as set forth in EPA's final rule, is fully implemented.

B. The NOx SIP Call is a technically feasible and cost-effective program

One of the arguments put forth by detractors of the NOx SIP Call is that control technologies are not feasible to meet the level of emission reductions needed to reduce ozone transport to acceptable levels. However, the fairly extensive experience in the United States with advanced post-combustion controls (such as Selective Catalytic Reduction or SCR, and Selective Non-Catalytic Reduction or SNCR) demonstrates that these technologies can provide significant NOx reduction capability for virtually every coal-fired boiler in the NOx SIP Call region at a very attractive

cost effectiveness. There are a number of studies, including one sponsored last year by the States of the Northeast States for Coordinated Air Use Management (NESCAUM—a regional association of the eight States of Connecticut, Massachusetts, Maine, New Hampshire, New Jersey, New York, Rhode Island, and Vermont) which indicate that control technologies are both technically feasible and cost effective. The NESCAUM study showed that there are significantly more low-cost opportunities for reducing NOx emissions from upwind regions than in the Northeast. The cost analysis found that power plants in the Midwest can meet the emission targets at an average cost of $662 per ton of NOx reduced versus more expensive options in the Northeast that would amount to $1,031/ton. Furthermore, the market-based system of allowance trading which EPA has developed is intended to provide source owners the flexibility to decide for themselves if technology or trading is more cost-effective.

Conclusion

Thank you for providing the opportunity to present the perspective of the State of Connecticut on the NOx SIP Call. As public officials we have a duty to do everything in our power to limit exposures to environmental pollutants and the resultant risks to public health associated with such exposures. It is simply sound public health practice to limit exposures to any environmental pollutant that is within our means to control. When an opportunity to protect public health on this scale presents itself and contains the added benefits associated with a technically feasible and cost-effective program such as the NOx SIP Call, that opportunity must be seized. Therefore, I urge the members of this subcommittee to fully support EPA's efforts to protect public health and address this regional problem. I would also urge the members of this subcommittee and Congress to avoid any initiatives to weaken the NOx SIP Call.

LETTER FROM JANE STAHL

July 22, 1999.

Committee on Environment and Public Works
Washington, DC 20510.

MR. CHAIRMAN: Thank you for the opportunity to present the views of the State of Connecticut on the EPA NOx SIP Call to the Subcommittee on Clean Air, Wetlands, Private Property, and Nuclear Safety, Committee on the Environment and Public Works.

In response to your correspondence of July 7, 1999, please find enclosed the responses of the State of Connecticut Department of Environmental Protection to the questions raised by several Members of the Committee. I would like to take this opportunity to reiterate the need for a regional solution to the problem of interstate transport of nitrogen oxides (NOx—a precursor to the formation of surface level ozone). Through July 21 of this year, the State of Connecticut has experienced eight (8) days where air quality exceeded the 1-hour health-based National Ambient Air Quality Standard for ozone (1-hour ozone NAAQS). The peak 1-hour ozone levels detected in Connecticut have reached 178 ppb; that is 44 percent higher than the 1-hour ozone NAAQS, which is designed to protect public health. Given that much of this pollution is transported into Connecticut on prevailing winds, reaching attainment of the 1-hour ozone NAAQS is unlikely if our State must first compensate for transported air pollution.

As you may know, following the committee's hearing EPA convened a meeting of the environmental commissioners and secretaries of all the States implicated in or by the NOx SIP Call. I believe this was an unanticipated yet positive outcome of the hearing. It is in the spirit of ongoing discussions between the States, and in the hope for an agreed upon regional resolution to air quality issues that I provide these additional comments.

Again, thank you for the opportunity to present the views of the State of Connecticut on the EPA NOx SIP Call. If you or any other member of the Subcommittee on Clean Air, Wetlands, Private Property, and Nuclear Safety, Committee on the Environment and Public Works should have any additional questions or require any additional information, please do not hesitate to contact me at (860) 424–3009.

Sincerely,

JANE K. STAHL, *Deputy Commissioner,*

RESPONSES BY JANE STAHL TO ADDITIONAL QUESTIONS FROM SENATOR INHOFE

Question 1. Ms. Stahl, in your testimony you cite a study commissioned by the Northeast States which claims that the average cost of reductions in the Midwest would be $662 dollars per ton. This is in direct conflict with Mayor Nye's real-world example that it would cost them $7,554 dollars per ton. You also state that the Northeast can do it for $1,031 dollars per ton. If Mayor Nye's estimate is correct do you still believe that they should go forward at that cost, or would it be more cost-effective for the Northeast to make the reductions?

Response. As I stated in my testimony, the regional, market-based, emission trading program included with EPA's NOx SIP Call will enable emission reductions across the region to be achieved in a more cost-effective manner than a program mandating a specific emission limit at each and every Affected facility (i.e., as would be the case under traditional command and control requirements). Under command and control, sources such as the one cited by Mayor Nye could face control costs significantly greater than the average cost incurred by the group of all Affected facilities. However, the market-based approach available under EPA 's NOx SIP Call will enable such sources to comply by purchasing surplus allowances from other sources that are able to economically reduce emissions beyond the rule's presumptive norm. The costs of allowances on the open market are expected to be within the range of those cited in my testimony. (Note: The control costs referenced in my previous testimony are from the attached NESCA UM report, "The Costs of Ozone Transport: Achieving Clean Air in the East"—see page 9)

The real-world cost of a 65 percent NOx reduction at Northeast Utility's Merrimack coal-fired power plant in New Hampshire was $404/ton using selective catalytic reduction (SCR). [Source: NH Dept. Env. Services] The projected cost for an additional level of SCR control to achieve an 85 percent NOx reduction is less than $800/ton of NOx reduced on an annual basis. Clearly, this real-world example of actual costs and reductions demonstrates how many large coal-f red power plants can comply at low cost with the NOx SIP Call and generate allowances for smaller sources to purchase in lieu of installing expensive controls that are of concern to Mayor Nye.

Furthermore, the situation described by Mayor Nye is not necessarily a direct result of the NOx SIP Call. States have the flexibility to choose where and how NOx reductions are made, and can implement a NOx "cap and trade " program to encourage greater reductions from the cheapest sources to control. The excess allowances can then be made available to smaller sources, such as the Hamilton, OH municipal power plant, for complying with the NOx SIP Call. The high cost cited by Mayor Nye for his particular situation would only apply (assuming the estimated cost is realistic) if the State of Ohio, not the U.S. EPA, specifically required the source to install specific controls under a "command and control " approach. The choice is Ohio's, and is not mandated by the NOx SIP Call. In fact, the State of Ohio need not require any reductions at all from the Hamilton, OH power plant. The NOx SIP Call provides each State the flexibility to meet its State NOx budget through greater reductions at less cost from other sources in the State if it chooses to do so. Nothing in the NOx SIP Call requires a specific level of reductions from the Hamilton, OH municipal power plant or any other power plant.

The success of the market-based approach to compliance has previously been demonstrated by sources subject to the Clean Air Act's Title IV acid rain program, as well as by sources in Connecticut (and elsewhere in the Northeast) covered by Phase I NOx RACT rules and OTC's current Phase II NOx control requirements. For example, several sources in Connecticut, which would have faced comparatively high control costs under a command and control scenario, were able to comply with the State's 1995 Phase I NOx RACT requirements by purchasing emission reduction credits on the open market at a much lower cost.

RESPONSES BY JANE STAHL TO ADDITIONAL QUESTIONS FROM SENATOR BAUCUS

Question. What advantages and disadvantages do you believe that the "Governors' proposal" on NOx reductions, as alluded to in the hearing, would have relative to EPA's proposed NOx SIP call?

Response. The primary disadvantages of the Southeast/Midwest Governors Alternative Plan (hereafter the Alternative Plan) compared to EPA 's NOx SIP Call are:

- No mandatory emissions cap. Unlike the NOx SIP Call, the Alternative Plan does not include a mandatory cap on emissions. Therefore, even if fully implemented, future growth to 2007 would essentially wipe out any overall NOx emission reductions attributable to the Alternative Plan. As a result, overall NOx

emission levels in 2007 would be virtually equal to Acid Rain Program Phase II NOx levels in 2000 (see the attached Figure 1, produced by the Ozone Attainment Coalition), which were found by EPA to be inadequate to address ozone transport concerns in the Northeast. Furthermore, with uncapped emissions, NOx emissions would continue to grow in future years under the Alternative Plan, eroding any minimal benefits provided by the proposed reductions through 2007. EPA 's SIP Call budget considers projected economic growth through 2007 and spreads responsibility without creating a bar to growth. In addition, note that the Alternative Plan results in 2007 emission levels approximately 2.5 times higher than emissions under the NOx SIP Call. The bulk of this difference in emissions is attributable to sources located in the Midwest and Southeast States (see Figure 2, also produced by the Ozone Attainment Coalition).

• Early reductions are minimal at best. The "early reductions" contained in the Alternative Plan don 't appear to be much greater than would be accomplished in the same timeframe under the NOx SIP Call. The Alternative Plan promises early "substantial reductions" by 2002 (the lesser of a 55/0 reduction or a 0.35 lb/MMBtu emission rate for affected sources), with 65 percent reduction or 0.25 lb/MMBtu by 2004. However, under the NOx SIP Call, prudent planning dictates that the 85 percent reduction (required by 2003) would be evenly spread over a 3-year period. As a result, by the second year (i.e., 2002), a 57 percent reduction would likely be accomplished under the NOx SIP Call. Therefore, the "early reductions " of the Alternative Plan do not appear to offer anything more than what the NOx SIP Call already provides.

• Need for further reductions already demonstrated. Under the Alternative Plan, the need for any future NOx reductions is contingent upon future modeling efforts conducted by the upwind States in the Southeast and Midwest. However, the need for region-wide emission reductions equivalent to the budget set in the NOx SIP Call to achieve the 1-hour ozone standard has already been demonstrated using both monitored data and modeled projections. Connecticut's ozone attainment demonstration, in addition to utilizing in-state control measures identified in my earlier testimony which are more stringent than those required by the Clean Air Act, relies on reductions associated with the region-wide budget set forth in the NOx SIP Call to meet the l-hour ozone NAAQS. Using an emissions budget greater than the level that serves as the basis of the NOx SIP Call, Connecticut is unlikely to demonstrate attainment of the 1-hour ozone standard. On a regional basis, the NOx SIP Call only reduces total NOx emissions by 25 percent from projected 2007 levels. Connecticut must still compensate for 75 percent of the remaining transport problem even with the full NOx SIP Call. Any control program less stringent than the full NOx SIP Call will require additional regional control on other source sectors, or it will be virtually impossible to achieve the public health standard for ozone.

RESPONSES BY JANE STAHL TO ADDITIONAL QUESTIONS FROM SENATOR LIEBERMAN

Question 1. Why not implement a program of fewer reductions as proposed by the Southeast/Midwest Governors?

Response. Many 1-hour ozone attainment demonstrations by Northeast States, Connecticut included, are relying on the full NOx SIP Call reductions to achieve attainment by 2007. Connecticut's demonstration just barely achieves attainment, indicating that the Southeast/Midwest Governors' proposal promising fewer reductions is not likely to achieve that goal.

Shortcomings of the Southeast/Midwest Governors Alternative Plan (hereafter the Alternative Plan) compared to EPA's NOx SIP Call include:

• No mandatory emissions cap. Unlike the NOx SIP Call, the Alternative Plan does not include a mandatory cap on emissions. Therefore, even if fully implemented, future growth to 2007 would essentially wipe out any overall NOx emission reductions attributable to the Alternative Plan. As a result, overall NOx emission levels in 2007 would be virtually equal to Acid Rain Program Phase II NOx levels in 2000 (see the attached Figure 1, produced by the Ozone Attainment Coalition), which were found by EPA to be inadequate to address ozone transport concerns in the Northeast. Furthermore, with uncapped emissions, NOx emissions would continue to grow in future years under the Alternative Plan, eroding any minimal benefits provided by the proposed reductions through 2007. EPA 's SIP Call budget considers projected economic growth through 2007 and spreads responsibility without creating a bar to growth. In addition, note that the Alternative Plan results in 2007 emission levels approximately 2.5 times higher than emissions under the NOx SIP Call The bulk of this difference in emissions is at-

tributable to sources located in the Midwest and Southeast States (see Figure 2, also produced by the Ozone Attainment Coalition).

- Early reductions are minimal at best. The "early reductions" contained in the Alternative Plan don 't appear to be much greater than would be accomplished in the same timeframe under the NOx SIP Call. The Alternative Plan promises early "substantial reductions " by 2002 (the lesser of a 55 percent reduction or a 0.35 lb/MMBtu emission rate for affected sources), with 65 percent reduction or 0.25 lb/MMBtu by 2004. However, under the NOx SIP Call, prudent planning dictates that the 85 percent reduction (required by 2003) would be evenly spread over a 3-year period. As a result, by the second year (i.e., 2002), a 57 percent reduction would likely be accomplished under the NOx SIP Call. Therefore, the "early reductions" of the Alternative Plan do not appear to offer anything more than what the NOx SIP Call already provides.
- Need for further reductions already demonstrated. Under the Alternative Plan, the need for any future NOx reductions is contingent upon future modeling efforts conducted by the upwind States in the Southeast and Midwest. However, the need for region-wide emission reductions equivalent to the budget set in the NOx SIP Call to achieve the 1-hour ozone standard has already been demonstrated using both monitored data and modeled projections. Connecticut's ozone attainment demonstration, in addition to utilizing in-state control measures identified in my earlier testimony which are more stringent than those required by the Clean Air Act, relies on reductions associated with the region-wide budget set forth in the NOx SIP Call to meet the 1-hour ozone NAAQS. Using an emissions budget greater than the level that serves as the basis of the NOx SIP Call, Connecticut is unlikely to demonstrate attainment of the 1-hour ozone standard. On a regional basis, the NOx SIP Call only reduces total NOx emissions by 25 percent from projected 2007 levels. Connecticut must still compensate for 75 percent of the remaining transport problem even with the full NOx SIP Call. Any control program less stringent than the full NOx SIP Call will require additional regional control on other source sectors, or it will be virtually impossible to achieve the public health standard for ozone.

Question 2. Some suggest that the NOx SIP call does not reflect the collaborative approach to rulemaking. Can you describe what role the States had in reviewing and commenting on proposals made through the Ozone Transport Assessment Group?

Response. The NOx SIP Call was EPA's response to recommendations from the multi-year program known as the Ozone Transport Assessment Group (OTAG). The OTAG process set a national precedent for active involvement of stakeholders in developing technical data and environmental policy. Within OTAG, the Policy Group consisting of the environmental commissioners from all OTAG States and the District of Columbia along with several high-ranking EPA of finials (non-voting members) served as a policy steering committee for the OTAG process and the various sub-groups. Participation in the OTAG process provided the States with ample opportunity to review and comment on the overall direction of the OTAG process as well as specific recommendations arising from that process. Given the large number of participants from a diverse group of States, potentially regulated sources, environmental groups and academia, it is understandable that not every participant was completely pleased with the results. The OTAG process, nor any other democratic process, can use 100 percent consensus as a benchmark for success. The most important aspect of the OTAG experience is that every participant was heard and each position considered.

OTAG'sfinal recommendations are a reflection of the multiple and divergent interests among the participants. As a natural result, OTAG recommended a range of NOx reductions, rather than a specific amount. EPA 's NOx SIP Call is within that range and supported by OTAG 's technical finding that greater NOx reductions resulted in greater ozone reductions across the region.

Question 3. In order to control NOx emissions, there are several stages of controls that can be utilized. One can change the fuel input; one can change when and where air is brought into the combustion process, and back end controls as catalytic and non-catalytic converters, or ambient enhanced injection technologies. The effect of failing to look at the air pollution in the regional, and I would say real world, context, is to force States who are downwind to move quickly through the series of technological fixes and to force the most costly, and draconian controls. Would you agree?

Response. Yes. States in the Northeast have been implementing progressively more stringent and costly emission reduction strategies aimed at attaining the ozone standard since implementation of the Clean Air Act in 1970. It has become apparent

that the transport of ozone and its precursors into the Northeast are hindering our efforts. In fact, draconian controls in the Northeast alone will not guarantee attainment of the ozone standard.

Question 4. Under the NOx SIP Call Rule what provisions are included to ensure that States have flexibility in determining a strategy for achieving the required reductions? Are there options for achieving reductions using different technical means, and would a situation that was described by Mayor Nye from Ohio, where a municipal utility provides the bulk of the power supply have limiting constraints that could similarly affect Connecticut under the Rule?

Response. The NOx SIP Call has been designed to reduce the transport component in the most cost-effective manner by allowing market forces to be considered in the business planning process concerning the decision on whether add-on emission controls are appropriate in a given circumstance. Sources contributing to the ozone precursor burden in the Eastern United States will be provided the flexibility to reduce emissions through implementation of add-on controls, by acquiring allowances from other sources who have reduced emissions at lower cost, or through a combination of less costly (and less effective controls) and the purchase of allowances.

The real-world cost of a 65 percent NOx reduction at Northeast Utility's Merrimack coal-fired power plant in New Hampshire was $404/ton using selective catalytic reduction (SCR). [Source: NH Dept. Env. Services] The projected cost for an additional level of SCR control to achieve an 85/0 NOx reduction is less than $800/ton of NOx reduced on an annual basis. Clearly, this real-world example of actual costs and reductions demonstrates how many large coal-fired power plants can comply at low cost with the NOx SIP Call and generate allowances for smaller sources to purchase in lieu of installing expensive controls that are of concern to Mayor Nye.

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The success of the market-based approach to compliance has previously been demonstrated by sources subject to the Clean Air Act's Title IV acid rain program, as well as by sources in Connecticut (and elsewhere in the Northeast) covered by Phase I NOx RACT rules and OTC's current Phase II NOx control requirements. For example, several sources in Connecticut, which would have faced comparatively high control costs under a command and control scenario, were able to comply with the State 's 1995 Phase I NOx RACT requirements by purchasing emission reduction credits on the open market at a much lower cost.

STATEMENT OF OF RUSSELL J. HARDING, DIRECTOR, MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

Good morning. My name is Russell Harding and I am the Director of the Michigan Department of Environmental Quality. I would like to thank you for giving me the opportunity to testify on the very important issue of achieving improvements in the air quality of our States.

I want to share with you Michigan's disappointment with the Environmental Protection Agency's inflexible, unworkable, and scientifically flawed approach toward reducing ozone transport in a rule that is known as the "NOx SIP Call." Under this approach, EPA is demanding that Michigan (as well as 21 other States and the District of Columbia) adopt regulations to drastically reduce the emissions of oxides of nitrogen from utilities and other major industries in our State. According to EPA, these reductions are necessary in the Midwest and Southeast, in order to reduce concentrations of ground level ozone in the Northeast.

Until recently, these regulations were to be in place by September of this year. Fortunately, this requirement has been temporarily "stayed" by the U.S. Court of Appeals, pending further review by the Court. We are hopeful that the Court will ultimately agree that the EPA demand is not justified.

It has long been our contention, indeed it was Michigan that filed suit against the EPA challenging the NOx controls, that administrative convenience and not sound policy served as the justification for the EPA NOx control plan. We believe, along with adopting a rule which has no scientific justification, the Agency has greatly exceeded its authority under the Clean Air Act to impose such requirements on States.

In addition to requiring States to adopt unnecessary NOx regulations, EPA has taken the unprecedented step of also developing a Federal implementation plan (or "FIP") that would impose these same extreme controls in our States. EPA has also worked in concert with States in the Northeast in attempting to use section 126 of the Clean Air Act to impose these controls at the Federal level. These actions include petitions by several States in the Northeast seeking these Federal regulations. In what we consider to be a breach of regulatory ethics, EPA has stepped outside its assigned role of objective decision-making, and instead has facilitated setting State against State in an unnecessary finger pointing battle. Unfortunately, this has resulted in costly lawsuits and a serious loss of credibility to the Agency.

Michigan, concerned with the lack of justification for the drastic program being proposed by EPA, has analyzed our State's contribution to the ozone problems in the Northeast States. The results of our analysis showed unequivocally that the EPA's methodology for determining the culpability of States for significant ozone transport was scientifically flawed. The analysis showed conclusively that imposition of extensive controls in Michigan would have very little benefit on northeastern nonattainment areas.

Our analysis is also consistent with the extensive study that was completed by the Ozone Transport Assessment Group (OTAG), and which EPA falsely claims as justification for their rulemaking. In fact, the OTAG analysis shows that by far the largest contributors to ozone nonattainment in the northeast are the Northeast States themselves. Some Northeastern States would actually contribute more to their neighbors' ozone levels after imposing EPA's controls than some Midwestern and Southern States contributed before imposing controls.

OTAG also recognized that additional analysis was necessary and called for the States to be given time to conduct additional "subregional" modeling. OTAG further recommended that a range of controls for the utility industry be considered, depending upon the results of the additional modeling, and the needs of the particular State and region. The EPA has effectively disregarded these recommendations by not allowing time for the additional modeling to be completed and by demanding an across the board level of control at the most stringent level possible with no variation between the States.

The extreme level of control demanded by EPA would impose billions of dollars of costs on sources, which are primarily power producing facilities, in a very short time period. This would threaten the reliability of the electric power supply system in the entire Midwest. In Michigan, this extreme level of control is simply not necessary to achieve air quality objectives.

I would also like to share with you the Michigan plan for improving air quality and the sound scientific basis upon which our proposal was developed. Michigan, along with several other States in the Midwest and Southeast, developed an alternative proposal for significant reduction of NOx emissions in our States. This plan would provide for a 65% reduction in NOx emissions from utilities (instead of the 85% sought by EPA), and similar reductions from other major industrial sources of NOx. The reductions at utilities will be accomplished in two phases, with substantial reductions by 2002, and final reductions by 2004.

Michigan is also providing flexibility to the affected sources in Michigan, by allowing one facility to trade emission reduction credits with another. We are doing so in accordance with an innovative and comprehensive emission-trading program that Michigan developed several years ago. The Michigan trading program is an open and voluntary system, as opposed to the closed and restrictive trading program developed by EPA. In addition, our system avoids the unnecessary restrictions on growth and economic development that are hallmarks of the EPA trading program.

In developing our proposal, Michigan also evaluated whether air emissions from sources in Michigan are having a "significant" impact on air quality in States that are downwind of us. We also analyzed the air quality improvement in downwind States that might result from controls in Michigan. This technical analysis reveals that Michigan is having a very slight impact on downwind States, and supports the control levels we are adopting.

The Michigan analysis is precisely the kind of analysis that EPA has refused to conduct. Instead of basing the emission reductions on real air quality impact, EPA has attempted to define "significant contribution" in terms of the cost of controls, and erroneously concludes that virtually all ozone transport is significant.

Michigan also was a party to the lawsuit that challenged the new national ambient air quality standard for ground level ozone, claiming that the EPA failed to provide a sound scientific basis for the standard it chose. This position has also been vindicated by another recent U.S. Court of Appeals ruling. The court, in its opinion, stated that the EPA had failed to provide an "intelligible principle" for the ozone standard and ruled that EPA cannot enforce the new standard.

It was clear from a panel of scientists that reviewed the standard that there was no clear benefit to human health or the environment in setting a new standard for ozone at the levels under consideration, and that setting a new standard was a "policy call" by the EPA. Nonetheless, EPA adopted a new ozone standard that would have immediately thrown Michigan and most other States into noncompliance, despite the fact that immense improvement has been made in air quality.

Michigan is proud of the clean air accomplishments in our State, and is committed to being a good neighbor. Michigan's two largest metropolitan areas have been redesignated as attainment of the old 1-hour standard for ozone, including the Detroit area, which became the largest metropolitan area in the country to achieve this goal several years ago. More recently, on the basis of air quality data, EPA has taken action recognizing that the 1-hour standard for ozone has been met in all other areas of the State.

Despite the recent court rulings that have placed the EPA requirements on hold, Michigan is moving forward with a NOx control program consistent with the alternative we proposed to EPA last year in conjunction with several Midwestern and Southern States. We are convinced that this level of NOx control is appropriate to address any contribution we may make to ozone problems in States that are downwind of us and will not threaten the reliability of the power supply in our State. In addition, it is a program that ensures the continued economic growth of our State. We are continuing to work with our neighboring States to encourage them to also proceed with NOx emission reduction strategies that are appropriate for their respective States and the region.

We are also committed to continuing our legal challenge as EPA has steadfastly refused to consider our proposal, or to honestly consider the many technical and legal flaws we have identified in the EPA rule. It is unfortunate that States such as Michigan have had to resort to litigation because of EPA's refusal to really listen to our concerns. Fortunately, the courts have now begun to hear our concerns, and are agreeing with the compelling arguments we are making. The courts will hopefully recognize the primary role that Congress has given the States in developing air pollution control programs, rather than having these programs dictated by EPA.

[Prepared for Northeast States for Coordinated Air Use Management, July 1998]

THE ROLE OF OZONE TRANSPORT IN REACHING ATTAINMENT IN THE NORTHEAST: OPPORTUNITIES, EQUITY AND ECONOMICS

(By Tim Woolf, David White, Bruce Biewald Synapse Energy Economics, and William Moomaw The Global Development and Environment Institute)

1. Introduction and Summary

Under the Clean Air Act, the Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards for ozone that must be met in order to prevent significant damage to public health and the environment. Yet a large number of States, particularly those in the eastern US, do not meet these standards, and are expected to face great difficulty in meeting them for the foreseeable future.

In November 1997 the EPA acknowledged that the transport of ozone and its precursors from upwind sources significantly contributes to the level of ozone in certain downwind States. Consequently, the EPA proposed a "SIP call" requiring certain upwind States to reduce NOx emissions to prescribed budget levels by 2003.

The transport of ozone and its precursors imposes economic costs upon downwind States, as those States must implement increasingly expensive options to reduce local emissions of NOx and VOCs in order to achieve attainment with the Federal ozone standards. The objective of this study is to estimate the extent of the economic impact experienced by downwind States as a consequence of transported ozone. We estimate the costs to the Northeast States of reducing local NOx emissions in order to offset the transported ozone.

Much of this study focuses on the opportunities and costs of controlling NOx emissions from the electric utility sector. This sector is a large source of NOx emissions—contributing 37 percent of the total NOx emissions in the Northeast, and 51 percent in the East-central region.[1] Electric power plants also offer the lowest-cost options for controlling NOx emissions, in general.

As of 1990, power plants in the East-central region produced roughly twice as much NOx emissions as power plants in the Northeast. This disparity is increasing over time as the Northeast States take greater measures than the East-central States to reduce NOx emissions. In 1996, power plants in the East-central region produced nearly four times as much NOx as those in the Northeast. If the East-central region does not meet the budget requirements of the EPA SIP call, then by 2003 the East-central power plants will be producing over seven times as much NOx as those in the Northeast.

Because of the relatively large volume of NOx emissions from the East-central region, the transport of ozone into the Northeast could be quite large relative to the amount of ozone that would be created by local NOx emissions in the Northeast. We estimate, using a range of ozone transport scenarios provided by Northeast States for Coordinated Air Use Management (NESCAUM), that the amount of transported ozone generated by NOx produced by East-central power plants, could be roughly one to three times as much as the local ozone generated by all of the NOx emitted from Northeast power plants.

We estimate that even after the East-central sources install additional NOx controls in accordance with Title IV of the Clean Air Act, the transport of NOx and ozone from the East-central electricity industry alone would require the Northeast States to incur roughly $1.4 to $3.9 billion in additional local NOx control costs each year. These costs would be incurred by controlling emissions from industrial point sources, motor vehicles, area sources, and the electric utility sector.

In addition, we have found that in some scenarios the Northeast sources are not able to offset all of the ozone transported from upwind sources—even after utilizing all currently known NOx reduction options. This result suggests that the Northeast will be unable to reach attainment of the ozone standard unless the East-central sources meet the EPA's proposed NOx budgets. This result also suggests that our estimates of costs imposed on the Northeast sources due to ozone transport might be significantly understated.

The rationale for requiring the East-central sources to meet the EPA's proposed budgets is supported by the fact that there are significantly more low-cost opportunities for reducing NOx emissions in the East-central region than in the Northeast. We estimate that the East-central power plants can meet the NOx emission budgets required in the EPA SIP call at an average cost of $662/ton. The Northeast power plants, on the other hand, will spend an average of roughly $1,031/ton to meet the EPA budgets—roughly 50 percent higher than the average cost to the East-central region.[2]

It is important to recognize that even if all States were to meet the EPA SIP call NOx budgets, the East-central sources will continue to emit relatively large volumes of NOx that will contribute to ozone in the Northeast. We estimate that if the East-central sources were to reduce NOx emissions from the electricity sector down to the levels implied by the EPA's SIP call budgets, the economic impact on the Northeast would be as high as roughly $0.2 to $1.1 billion each year.

Our study suggests that the overall costs of controlling NOx emissions could be reduced if the EPA were to adopt some form of NOx credit trading system—to allow the Northeast sources to purchase some of the relatively low-cost NOx reductions that are available from the East-central sources. A NOx credit trading system will help mitigate the burden on the Northeast sources in reaching attainment of the ozone standard, and will also mitigate the net costs to the East-central sources of meeting the EPA SIP call budgets.

The public health impacts of the ozone transported into the Northeast are not considered in this report. Hence, the total health and economic costs of transported ozone are greater than the costs presented above.

The large ozone reservoir in the Ohio River Valley returns each summer with little abatement. Researchers have found no significant trends in regional ozone levels from 1980 to 1995 (Five, et al., 1998). While urban levels have decreased somewhat due to pollution controls on automobiles regional ozone and NOx levels have not sig-

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[1] We define the Northeast to include New England, NY, NJ, PA, and MD; and the East-central region to include KY, IN, MI, OH, VA, and WV (see Section 3).

[2] While these Northeast control options are expensive relative to those available in the East-central region, they are less expensive than control options available from other sectors ire the Northeast.

nificantly changed. This is due in large part to the lack of significant NOx reductions from fossil fuel power plants which, in places such as the Ohio River Valley, contribute 40–50 percent of the total NOx emissions in a given region. Between 1987 and 1996, NOx emissions from power plants rose 3 percent nationally (EPA, 1998). Because regional ozone is more sensitive to NOx controls than VOC controls, the lack of significant NOx reductions from power plants is impeding progress toward reducing ozone levels.

The movement of ozone from the Ohio River Valley into the Northeast was seen as early as 1979. During early August in 1979, scientists tracked a mass of ozone leaving Ohio, crossing Pennsylvania and southern New York, and entering into the Northeast Corridor (Clarke and Ching, 1983). When this mass of air from the Ohio River Valley entered into the Northeast . Corridor, it contained about 99 parts per billion (ppb) of ozone.[3] The 1-hour Federal ozone standard is equivalent to 120 ppb (0.12 parts per million). Therefore, the amount of ozone observed entering the Northeast was more than 80 percent of the 1-hour ozone standard and represented a significant contribution to the overall ozone burden experienced in the Northeast during that time.

As the persistent ozone reservoir establishes itself every summer in the Ohio River Valley, large amounts of ozone continue to be transported into the.Northeast from the west. During the summer of 1995, the North American Research Strategy for Tropospheric Ozone-Northeast (NARSTO-NE) conducted aircraft measurements of ozone in air masses along the western edge of the Northeast Corridor. During pre-dawn hours, scientists measured ozone levels up to and in excess of 100 ppb above Shenandoah, VA, Gettysburg, PA, Poughkeepsie, NY, and other locations in the Northeast (Lurmann, et al., 1997). During this time of morning, the ozone could not have been formed locally (no sunlight is present to initiate the formation of ozone), so it must have been transported during the overnight hours. Wind direction on some of the highest ozone days (e.g., July 14, 1995) was out of the west (Blumenthal, et al., 1997). Therefore, it is reasonable to conclude that the ozone traveled into the Northeast from points to the west, i.e., the Ohio River Valley.

At transported ozone levels of over 100 pub during the pre-dawn hours, the Northeast is already over 80 percent on the way to an exceedance of the 1-hour standard before the sun rises. The Northeast is in the predicament of achieving the 1-hour 120 ppb Federal ozone standard in situations where 100 ppb or more of the ozone is beyond its control. Only an additional 20 ppb of ozone generated within the Northeast will cause an exceedance of the 1-hour standard, and the situation is even worse for the 80 ppb 8-hour standard. The high levels of transported ozone virtually guarantee that the Northeast will not achieve air quality goals without NOx reductions from upwind sources.

3. Estimating Ozone Transport Into the Northeast

A range of ozone transport into the Northeast can be estimated from the field measurements mentioned in the preceding section, and from computer modeling of ozone formation and transport. Based on results from a model called CALGRID[4] we estimate a plausible contribution of transported ozone from outside the Northeast to ozone exposure above the 1-hour 120 ppb and the 8-hour 80 ppb standards inside the Northeast in the range of 20–45 percent. This was estimated as described in the following text.

Two modeled scenarios were generated for a severe ozone episode occurring on 11–15 July 1995 in the eastern United States.[5] In the first modeled scenario, the reductions proposed in the EPA NOx SIP call were applied only within the Northeast Ozone Transport Region (OTR), and current Clean Air Act measures were put in place outside the OTR using emissions projected for 2007 (Run 1). In the second scenario, the EPA NOx SIP call reductions were applied throughout 22 eastern States (Run 2).

In each scenario, the total ozone exposure above the 1-hour 120 ppb standard and the 8-hour 80 ppb standard was determined. The total exposure to ozone above the 1-hour standard was calculated from the model by multiplying all calculated ozone concentrations above 125 ppb by the total hours above 125 ppb and the area of each modeled grid cell (144 km^2) in which an ozone concentration above 125 ppb oc-

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[3] The researchers also indicated that as the air mass entered the Northeast corridor, it contained enough transported precursor.emissions (NOx and VOCs) to generate an additional 35 ppb of ozone on top of the 99 ppb already formed. Consequently, the amount of background ozone and precursors entering the Northeast could have resulted in an exceedance of the l-hour ozone standard in the Northeast even if no additional precursor emissions occurred locally.

[4] USEPA has approved the CALGRID model for ozone attainment planning purposes in the New England Domain.

[5] Communication from Mark Fernau, Earth Tech, Inc., Concord, MA.

curred. For the 8-hour standard, a surrogate 1-hour value of 110 ppb was used as the threshold exposure level in the model, and the total exposure was calculated in the same manner as for the 125 ppb threshold. The 1-hour threshold of 110 ppb is used because ozone monitoring data suggest that when a 1-hour concentration of 110 ppb is reached or exceeded, it typically coincides with an 8-hour average above 85 ppb at the same monitor.[6]

The reduction in ozone exposure within the Northeast Ozone Transport Region (OTR) due to NOx controls outside the Northeast is shown in Table 1. The reduction is given as the percentage decrease in ozone exposure between Run 1 (EPA NOx SIP call in the OTR only) and Run 2 (EPA NOx SIP call in 22 eastern States).

Table 1. Percent reduction in ozone exposure (ppb hr/km2) greater than 125 ppb (1-hour standard) and 110 ppb (surrogate for 8-hour standard) within the Northeast Ozone Transport Region due to applying the EPA NOx SIP call beyond the borders of the QTR.

Percent daily reduction in modeled ozone exposure within the Northeast Ozone Transport Region due to 22 State NOx SIP call

	July 11	July 12	July 13	July 14	July 15
Reduction in ozone exposure >125 ppb	-31%	-16%	-35%	-33%	-42%
Reduction in ozone exposure >110 ppb	-37%	-27%	-32%	-34%	-47%

Modeled reductions are based on 11–15 July 1995 ozone episode.

Based on the modeled reductions in Table 1 and the high levels of ozone observed entering the Northeast during the field studies mentioned above, we estimate a plausible contribution range of 20–45 percent to ozone exposure above the 1-hour and 8-hour standards in the Northeast Ozone Transport Region due to transported ozone from outside the region.

The estimated range is consistent with modeling results from the Ozone Transport Assessment Group (OTAG). OTAG estimated ozone transport impacts by "turning off" all human-related sources of NOx and VOC emissions in various parts of the eastern United States. When human-related emission sources were set to zero in the OTAG model (OTAG used a model called UAM-V), changes in ozone levels in downwind receptor regions could be estimated. These modeling runs indicated that human-related emissions in various upwind regions significantly contributed to ozone levels in downwind receptor regions. For example, OTAG results for the July 1995 episode indicated that turning off NOx and VOC emissions in parts of the Ohio River Valley reduced ozone exposure above 120 ppb in the Philadelphia area by 41 percent, and in the Baltimore/Washington, DC area by 43 percent.[7]

4. The Economic Impact of Ozone Transport Into the Northeast

The estimated contribution of 20–45 percent from out-of-region ozone transport to ozone levels above Federal standards within the Northeast Ozone Transport Region raises the possibility of additional economic costs within the Northeast due to more stringent local control levels as well as Federal penalties for failure to achieve the ozone standards. With this in mind, NESCAUM asked Synapse Energy Economics and The Global Development and Environment Institute to analyze the potential economic costs to the Northeast should the EPA NOx SIP call not be fully implemented.[8]

The attached analysis finds that if no additional NOx measures beyond Clean Air Act acid rain controls are applied on sources upwind, the additional control costs in the Northeast to compensate for ozone transport could be from $1.4 to $3.9 billion each year. If upwind sources met the reductions in EPA's NOx SIP call, the economic costs to the Northeast will be reduced to about $0.2 to $1.1 billion each year.

[6] The values of 125 ppb (1-hour) and 85 ppb (8-hour) are used to be consistent with USEPA's monitoring test for an ozone exceedance. According to USEPA's data truncation guidance, an exceedance of the l-hour ozone standard does not occur until monitored 1-hour concentrations reach or exceed 125 ppb, and an 8-hour exceedance does not occur until the 8-hour average reaches or exceeds 85 ppb. For the modeling test, this may be a conservative threshold to use because models often underestimate observed peak ozone concentrations.

[7] Tables of ozone exposure data calculated from the OTAG July 1995 modeled episode can be found at the OTAG Northeast Modeling and Analysis Center web address: http://sage.mcnc.org/OTAGDC/agm/uamv/jul95.

[8] While certainly not insignificant, the additional health and ecological costs for the Northeast were not included in the analysis.

In addition, there are significantly more low-cost opportunities for reducing NOx emissions at upwind sources than in the Northeast. Upwind power plants are estimated to be able to meet the EPA NOx SIP call budgets at an average cost of $662/ton. Northeast power plants will spend about 50 percent more to achieve the same budget requirements—about $1,013/ton. While the cost to Northeast power plants is still reasonable, there are not enough reductions remaining available from these emission sources to fully offset the impact of transported ozone. The remaining reductions must come from other emission sectors at higher costs. A full description of the cost analysis is presented in the following attachment.

5. Additional Economic Costs of Ozone Nonattainment to the Northeast

The Clean Air Act imposes penalties upon States that do not meet the ozone standard by prescribed timelines. Transported ozone from outside the region will increase the likelihood that Northeast States will not reach attainment by the deadlines and will be subject to at least some of the Federal penalties. These nonattainment penalties represent an additional cost that out-of-region sources can impose upon the Northeast due to unmitigated ozone transport.

The penalties imposed by the Clean Air Act will depend upon the circumstances in each State, the degree to which the State has not reached attainment, and the actions that the EPA decides are necessary in order for the State to reach attainment. There are three main types of penalties imposed for not meeting attainment deadlines. The first is the loss of Federal funding for highway projects. A nonattainment State can lose Federal funding for the majority of highway projects, such as highway capacity increases, transportation enhancements, transportation control measures, transit projects, traffic flow improvements, and more. A few projects such as safety-related measures will be exempted, and will be available for Federal funding.

The second penalty for not meeting attainment deadlines is an increase in the offset ratio applied to new sources of NOx and VOC emissions. Currently, if a business or industry in the Northeast wishes to create a new source of NOx or VOC emissions, it must obtain emission "offsets" that are greater than the amount of new emissions. The emission offset ratio ranges between 1.15-to–1 and 1.3-to–1, depending upon how far the region is from reaching attainment. If attainment deadlines are not met, this offset ratio could be increased to a ratio as high as 2-to–1. Such a change could pose significant barriers to new industries locating in the State, thus hindering the State's opportunities for economic growth.

The third penalty for not meeting attainment deadlines is the imposition of a Federal implementation plan (FIP), which would supersede the State implementation plan in order to assist the State in reaching attainment. The emission control measures required by a Federal implementation plan would depend upon the types of emissions in the State, as well as the degree to which the State was in nonattainment. The FIP would potentially add new Federal oversight, reporting and permitting processes to the State's existing processes.

References

Blumenthal, D.L., et al. 1997. Transport and Mixing Phenomena Related to Ozone Exceedances in the Northeast United States, Sonoma Technology Report STI–996133–1710-WD1.1, February.

Clarke, J.F. & J.K.S. Ching 1983. Aircraft Observations of Regional Transport of Ozone in the Northeastern United States, Atmos. Envt., Vol. 17, pp. 1703–12.

EPA 1998. National Air Quality and Emissions Trends Report, 1996, EPA 454/R–97–013, p. 17, January.

Fiore, A.M., D.J. Jacob, J.A. Logan, & J.H. Yin 1998. Long-Term Trends in Ground Level Ozone over the Contiguous United States, 1980–1995. J. Geophys. Res., Vol. 103, pp. 1471–80. Gillani, N.V. & W.E. Wilson 1980. Formation and Transport of Ozone and Aerosols in Power Plant Plumes, Ann. N.Y. Acad. Sci., Vol. 338, pp. 276–96.

Husar, R.B. 1996. Spatial pattern of daily maximum ozone over the OTAG region, Web address: http://capita.wustl.edu/OTAG/Reports/otagspat/otagspat.html.

Lippmann, M. 1993. Health effects of tropospheric ozone: Review of recent research findings and their implications to ambient air quality standards. J. Exposure Analysis and Envtl. Epidemiology 3: 103–127

Lurmann, F.W., et al. 1997. Evaluation of the UAM-VModel Performance in the Northeast Region for OTAG Episodes, Sonoma Technology Report STI–996133–1716-WD2.1, March.

Miller, D.F., A.J. Alkezweeny, J.M. Hales, & R.N. Lee 1978. Ozone Formation Related to Power Plant Emissions, Science, Vol. 202, pp. 1186–88.

Ozkaynak, H., J.D. Spengler, M. O'Neill, J. Xue, H. Zhou, K. Gilbert and S. Ramstrom-Harvard School of Public Health. 1996. Breathless: Ambient ozone exposure and emergency hospital admissions/Emergency room visits in 13 cities. American Lung Association Report. Washington, D.C.

White, W.H., D.E. Patterson & W.E. Wilson, Jr. 1983. Urban Exports to the Nonurban Troposphere: Results from Project MISTT, J. Geophys. Res., Vol. 88, pp. 10,745–52.

2. Background and Context

In general, the Clean Air Act provides each State with the responsibility for achieving compliance with the National Ambient Air Quality Standards. However, pollutant emissions and impacts within one State often affect the environment and compliance plane of downwind States. In 1990, the Clean Air Act Amendments established the Ozone Transport Region (OTR) in order to address the problem created by the transport of ozone across State boundaries in the Northeast.[3] In 1995, the Ozone Transport Assessment Group (OTAG) was established to investigate the significance of ozone transport among the 37 eastern-most States in the United States.

After reviewing OTAG's findings and recommendations, the EPA found in October 1997 that the transport of ozone and its precursors from certain States within OTAG contributes to the nonattainment problems in other downwind States. Consequently, the EPA issued a "SIP call" under Section 110 of the Clean Air Act, requiring certain upwind States to revise their State implementation plans (SIPs) and to achieve NOx emission limits in order to mitigate the problem of transported ozone (EPA 11/1997).

The SIP call proposes a specific summer NOx emission budget for each of the 22 States (and the District of Columbia) that contribute to the ozone transport problem.[4] The summer NOx emission budgets for the electricity sector are determined by assuming that fossil-fueled plants in each State install currently available, cost-effective control technologies, to achieve an average emission rate of 0.15 lb/MMBtu. Summer NOx emission budgets are also derived for other industry sectors and mobile sources. While EPA derived NOx budgets for each NOx emission sector, the States have flexibility in determining how to achieve their overall NOx budget. The EPA proposes that States be required to meet these summer NOx emission budgets by 2003 or shortly thereafter.

Many electric utilities are already taking steps to reduce their NOx emissions. Under Title IV of the Clean Air Act, all US utility coal plants larger than 25 MW are required to meet NOx emission standards. Phase I of these standards began in 1996, and Phase II will begin in the year 2000. These NOx standards range from 0.40 to 0.86 lb/MMBtu, depending upon the type of power plant boiler. Thus, they are significantly less stringent than the average emission rate used by the EPA to set the SIP call budgets.

In addition, the Northeast States have agreed to reduce NOx emissions from the electricity sector by May 2003, as a consequence of their efforts in the Ozone Transport Commission (OTC). They have agreed to reduce NOx emissions to 75 percent of 1990 levels, or to emit NOx at a rate no greater than 0.15 lb/MMBtu, whichever is less stringent.[5] Hence, the Northeast States have already agreed to reduce their NOx emissions to levels that are close to those required by the EPA NOx SIP budgets. Even with these NOx reductions, some Northeast States are expected to remain in nonattainment for the 1-hour ozone standard, and more are expected to be in nonattainment for the 8-hour ozone standard.

3. Methodology

Our analysis focuses primarily on NOx emissions and controls in the electricity industry, because of large volume of emissions and the opportunities for relatively low-cost NOx reductions from fossil-fueled power plants. We utilize a data base consisting of nearly all coal, oil and natural gas plants larger than 25 MW in the

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[3] The OTR includes CT, DE, MA, ME, MD, NJ, NY, NH, PA, RI, VT, the District of Columbia (DC), and the DC metropolitan area that is within northern VA.

[4] The EPA assigned a NOx budget to DC and the following States: AL, CT, DE, GA, IL, IN, KY, MD, MA, MI, MO, NJ, NY, NC, OH, PA, RI, SC, TN, VA, WV, WI (EPA 11/1997).

[5] In fact, the OTR is divided into three zones: Inner, Outer and Northern. The Northern Zone, which includes Maine, New Hampshire, Vermont, and northeastern New York, will be required to reduce NOx emissions by 55 percent from 1990 levels, or to emit NOx at a rate no greater than 0.2 lb/MMBtu, whichever is less stringent.

Northeast and East-central regions.[6] The database includes information on the operating costs, electricity generation, NOx emissions and existing NOx controls for these plants in 1996. The data base was assembled using (a) unit characteristic data from the Energy Information Administration of the Department of Energy, (b) NOx emissions data from the Environmental Protection Agency, and (c) power plant cost and operation data from the Utility Data Institute.

We also compiled information on the performance and costs of various NOx control technologies for coal, oil and natural gas plants. All of our assumptions for NOx control technologies in the electricity sector were the same assumptions used by the EPA in its analysis of the ozone transport proposed rulemaking (EPA 1996; EPA 9/1997). For coal-fired power plants, we considered low-NOx burner (LNB) options, low-NOx coal-and-air nozzles, gas reburn, selective noncatalytic reduction (SNCR), and selective catalytic reduction (SCR) technologies. For oil- and gas-fired power plants we considered gas reburn, SNCR and SCR. Combustion technologies were applied in combination with post-combustion technologies, where cost-effective.

NOx control technologies often require significant up-front capital costs, as well as on-going annual operation and maintenance costs. We have levelized the capital costs in order to present total control costs in annual terms. All costs presented in this study are in 1995 dollars. We do not account for increases or decreases in NOx control costs beyond inflation. A more detailed discussion of our assumptions regarding NOx control cost in the electricity sector is provided in Appendix A.

Our general approach is to identify the NOx control technologies that would likely be adopted on a plant-by-plant basis to meet various levels of NOx standards in the Northeast and East-central regions. We begin with a snapshot of control technologies that are in place today. We then develop reference scenarios that account for all of the NOx controls that utilities are expected to install by 2003 to comply with provisions of the Clean Air Act. We then look at increasingly stringent levels of NOx standards, and identify the least-cost control technologies that would be installed and the costs that would be incurred in meeting them. This allows us to develop curves indicating the average and marginal costs of NOx controls in the two regions.

We define the Northeast States as all of the New England States, New York, New Jersey, Pennsylvania and Maryland. We define the East-central States as Kentucky, Indiana, Michigan, Ohio, Virginia and West Virginia. These regions are presented in the map in Figure 3.1. These regions were defined this way because they correspond to regions that were modeled by OTAG.

In discussing the transport of ozone, we generally refer to the Northeast region as "downwind," and the East-central region as "upwind." In fact, the transport of ozone is much more complicated than this. Some States within the Northeast (e.g. Pennsylvania) are upwind of other States in the Northeast. A number of States outside the Northeast are upwind from the East-central sources. In addition, other States contribute to ozone transport within and outside the East-central and Northeast regions. We have defined these two regions as upwind versus downwind in order to simplify our analysis. We do not mean to imply that States falling outside either of these regions do not contribute to (or suffer from) the ozone transport problem.

Given that the EPA has proposed NOx budgets for the year 2003, we have modified our data base to reflect the operation of existing power plants in that year. We use the same assumptions for the growth in power plant utilization that were used by the EPA in its analysis of NOx budgets in the proposed rulemaking. The existing fossil-fired power plants can meet all of the EPA's assumed growth in utilization by increasing their capacity factors. Therefore, we have assumed that no new power plants will be operating in 2003.

Our assumptions regarding NOx control options for the electricity sector are limited to "bolt-on" control technologies. We do not consider other options such as fuel-switching, repowering, plant retirement, alternative dispatching approaches or power plant efficiency improvements. In addition, we do not account for technological improvements and cost reductions for NOx control measures as the market demand for them increases over time. Consequently, our estimates of NOx control costs for the electricity sectors in both the Northeast and East-central region represent high-side estimates.

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[6] The data base does not contain information on gas turbines. The power plants in the data base represent 98 percent of the generation in the Northeast and 99 percent in the East-central region.

4. The Sources of NOx Emissions in the Northeast and East-Central Regions

Table 4.1 presents an overview of the anthropogenic NOx emissions in both the Northeast and East-central regions in 1990. The same information is presented in Figure 4.1 below. Two points are relevant for our analysis. First, electric utilities are responsible for a large portion of NOx emissions—accounting for roughly 37 percent of emissions in the Northeast and 51 percent of emissions in the East-central region. Consequently, the potential for NOx reductions is greater in the electricity sector, simply on the basis of the volume of emissions.

Second, power plants in the East-central States are responsible for roughly twice as many NOx emissions as power plants in the Northeast States. As a result, the power plants in the East-central region provide the greatest opportunity for reducing NOx emissions.

Table 4.1 Volume of 1990 NOx Emissions, by Sector (tons/summer day).

	Northeast	East-Central
Electric Utility	3,740	7,205
Point Sources: Non-Utility	1,229	1,363
Motor Vehicles	3,439	3,318
Area Sources: Non-Road	1,324	1,380
Area Sources: Other	460	794
Total	10,192	14,060

Source: The Ozone Transport Assessment Group.

The high emissions of NOx from the East-central electric utilities are due in part to the fact that the East-central region relies upon coal-fired power plants for the majority of its electricity generation. In 1996 the East-central region obtained nearly 87 percent of its generation from coal-fired plants, whereas the Northwest relied upon coal plants for only 46 percent of its generation.

In addition, the Northeast States have already taken more steps than those in the East-central region to reduce their NOx emissions. In the Northeast, electric utilities have installed low-NOx burners on roughly 75 percent of coal plants, 41 percent of oil plants, and 54 percent of gas plants. Electric utilities in the East-central region, on the other hand, have to date installed low-NOx burners on only 43 percent of their coal plants and none on their oil and gas plants.

As a result of these NOx control efforts, the average NOx emission rate from all fossil-fired power plants in the East-central region is currently significantly higher than that in the Northeast. In 1996 the average NOx emission rate from fossil plants in the Northeast was 0.42 lb/MMBtu, whereas the average rate in the East-central region was 0.69 lb/MMBtu—roughly 67 percent higher than in the Northeast.

In addition, the Northeast relies less heavily on fossil-fired plants for generating electricity than the East-central region. Consequently, the difference in the average NOx emission rate across all electric generation is even greater than for the emission rate that only includes fossil units. In 1996 the average NOx emission rate from all power plants in the Northeast was 2.6 lb/MWh, whereas the average NOx emission rate from all power plants in the Midwest was 6.6 lb/MWh—roughly 2.5 times higher than in the Northeast.

5. Opportunities for NOx Reductions in the Electric Utility Sector

We investigate the likely cost of NOx controls in the East-central and Northeast regions under different future scenarios. For the East-central region, our reference scenario assumes that utilities meet the NOx standards required by Phase II of Title IV of the Clean Air Act. In other words, this scenario accounts for all of the NOx controls that East-central utilities are expected to install by 2003 in the absence of any requirements of the EPA SIP call. Under this scenario we estimate that East-central utilities would reduce their NOx emissions to an average rate of 0.5 lb/MMBtu.[7] We refer to this scenario as the "Title IV Only Scenario."

[7] The NOx emission standards required by Title IV range from 0.40 to 0.86 lb/MMBtu, depending upon boiler design. The majority of boilers are required to meet standards of 0.4 and 0.46 lb/MMBtu.

For the Northeast region, our reference scenario assumes that utilities meet the much more stringent standard of 0.15 lb/MMBtu, as required by the EPA SIP call. We therefore refer to this scenario as the "EPA Budget Scenario."[8]

We then analyze scenarios where greater NOx controls are applied in Me East-central and the Northeast electricity sectors. For each scenario we estimate Me types of NOx control technologies likely to be applied on a plant-by-plant basis, as well as the associated costs. For the East-central region, we analyze an "EPA Budget Scenario" in order to estimate the impact of meeting Me NOx budgets in the EPA SIP call. For the Northeast region we also analyze a "Beyond EPA Budget Scenario," which goes beyond the requirements of the EPA SIP call and utilizes all of the reasonably available bolt-on control technologies. Our results are presented in Table 5.1 and Figure 5.1.

Table 5.1 Costs of Controlling NOx in the East-Central and Northeast Electricity Sectors in 2003.

	Average NOx Emissions (lb/MMBtu)	NOx Reduction from current year (1000 tons/year)	Control cost from current year (million $/year)	Average control cost ($/ton)
Northeast:				
1996 Control Level	0.40	n.a.	n.a.	n.a.
EPA Budget	0.15	344	354	1,031
Beyond EPA Budget	0.10	412	472	1,145
East-Central:				
1996 Control Level	0.68	n.a.	n.a.	n.a.
Title IV Only	0.50	571	59	103
EPA Budget	0.15	1,641	1,087	662

Notes: All costs are in 1995 dollars. See Appendix A for control cost assumptions. The Average Nt)X emission rates for the 1996 Control Level Scenario are slightly lower than the actual rates in 1996 because they are based on generation that has been adjusted to 2003 levels.

Our results in Table 5.1 indicate that the costs of controlling NOx in the Northeast is significantly higher than in the East-central region. If the Northeast States meet the EPA Budget Scenario, while the East-central power plants meet the Title IV Only Scenario, then their average control costs (in $/ton) will be ten times higher than for the East-central region. Even in the scenarios where the two regions meet the same average NOx emission rate of 0.15 lb/MMBtu, the Northeast will incur average NOx control costs of $1,031/ton—roughly 56 percent higher than the $662/ton incurred by the East-central region. This difference in control costs is partly because the Northeast has already taken many measures to control NOx emissions under the OTC Memorandum of Understanding.

Marginal costs provide another indication of the extent to which NOx control costs in the Northeast are higher than in the East-central region.[9] Figure 5.1 presents a graphical representation of the marginal NOx control costs for both the Northeast and East-central regions, at various levels of NOx controls. The X-axis indicates the cumulative amount of NOx reductions relative to the 1996 control levels, while the Y-axis indicates the marginal NOx control costs (in $/ton) for each level of NOx reduction. The Northeast control cost curve intersects the Y-axis at the 1996 Control Level Scenario emission rate of 0.40 lb/MMBtu, and climbs up to the Beyond EPA Budget Scenario emission rate of 0.10 lb/MMBtu. The East-central.control cost curve intersects the Y-axis at the 1996 Control Level Scenario emission rate of 0.68 lb/MMBtu, and climbs up to the EPA Budget Scenario emission rate of 0.15 lb/MMBtu.

The two control cost curves in Figure 5.1 indicate the extent to which there are significantly greater low-cost opportunities to control NOx emissions in the East-central region relative to the Northeast. In the Northeast the low-cost options have already been adopted, and there are fewer plants on which to apply the higher-cost options. The Northeast curve becomes quite steep after the average emission rate of 0.15 lb/MMBtu is achieved. Our analysis indicates that it is difficult to achieve

[8] We choose the EPA Budget Scenario as our reference scenario because it is similar to the standards already agreed to by the OTR States in the OTC Memorandum of Understanding, where States have a choice of meeting a 0.15 lb/MMBtu average emission rate or achieving a 75 percent reduction from 1990 emissions. (OTC 1994).

[9] Marginal control costs represent the cost of controlling a small increment of NOx at a particular level of control (e.g., at the 0.15 lb/MMBtu point). Average control costs, on the other hand, represent the cost of controlling all of the NOx emissions from a baseline level (e.g., 1996 control levels) to a higher level of control.

further NOx reductions in the Northeast after the 0.10 lb/MMBtu average emission rate is achieved.[10]

In the East-central region the marginal control cost curve is much less steep than the Northeast, and there are many more opportunities for low-cost emission reductions. For example, in the Title IV Only Scenario the East-central power plants would be able to achieve 571,000 tons of NOx reductions—more than the amount available in the Northeast under the Beyond EPA Budget Scenario—at a marginal cost of less than $500/ton and an average cost of roughly $103/ton.

Figures 5.2 and 5.3 present the extent to which the Northeast and East-central utilities are expected to install NOx controls in the various scenarios that we investigate. For simplicity we group NOx control technologies into two categories. The combustion control category includes the relatively low-cost options, such as low-NOx burners, low-NOx coal-and-air models, coal reburning, and others. The SCR category includes the more expensive SNCR and SCR post-combustion controls. In some cases, plants are assumed to install both combustion controls and SCR post-combustion controls to achieve the maximum amount of NOx reductions.

As indicated in Figures 5.2 and 5.3, the Northeast has currently installed significantly more low-cost combustion controls than the East-central region. In order to meet the requirements of the EPA Budget Scenario, the Northeast will have to install combustion controls on almost all of its fossil-fired generation units, as well as SCR controls on 82 percent of the fossil-fired units. If the East-central utilities simply meet the Title IV Ohly Scenario, they could install only combustion controls on roughly 80 percent of their fossil-fired generation units. In order to achieve the average emission rate of 0.15 lb/MMBtu, the two regions will both have to install combustion controls on nearly all fossil-fired generation units, as well as SCR controls on over 70 percent of the units. If the Northeast utilities wish to achieve the lower average emission rate of 0.10 lb/MMBtu, they will have to also install combustion controls and SCR controls on nearly all fossil-fired units.)[11]

6. The Economic Impact of the Transport of Ozone

6.1 The Extent Ozone Transport from the East-Central Power Plants

The transport of ozone and its precursors from the East-central region to the Northeast will require the Northeast States to adopt more local NOx and VOC controls than they otherwise would adopt to meet ozone attainment standards. These local NOx and VOC controls will be relatively expensive because most of the low-cost NOx and VOC controls would have already been implemented by the Northeast States.

In order to estimate the extent of the additional costs to the Northeast, we begin by estimating the approximate amount of NOx and ozone that is transported from the East-Central region to the Northeast. While OTAG has addressed this question In its air quality modeling analyses, there still remains considerable debate about the extent to which ozone is transported between the two regions.

In order to provide an illustration of the plausible extent of ozone transport, we assume a range of amounts of ozone transported from the East-central region. This range was developed by NESCAUM, and is described in a companion document prepared by them. In our Low Transport Case, we assume that 20 percent of the NOx emissions from the East-central power plants are transported to the Northeast States, as either NOx or an equivalent level of ozone. In our Medium and High Transport Cases, we assume that 30 and 45 percent of the NOx emissions from the East-central plants are transported to the Northeast, as either NOx or an equivalent level of ozone.[12]

We estimate that the NOx emissions from East-central power plants in the Title IV Only Scenario will be roughly 1,525 thousand tons per year. Consequently, our Low, Medium and High Transport Cases imply that the ozone transported from the East-central region to the Northeast is equivalent to roughly 305, 457 or 686 thousand tons of NOx emissions. For comparison purposes, in the EPA Budget Scenario

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[10] A few plants remain without SCR control technologies in this scenario, but their capacity factors are so low that installing SCR does not significantly reduce NOx emissions. Power plant owners could begin reflowering with natural gas or retiring coal-fired plants to achieve additional reductions beyond the 0.10 lb/MMBtu average level, but we have not evaluated the economics of these options.

[11] As described in Section 3, we do not consider all of the power plant control options available, such as fuel-switching, repowering or coal unit retirement. In practice, therefore, it may not be necessary to implement all of the control options presented in Figures 5.2 and 5.3.

[12] In fact, a significantly larger portion of NOx emissions from the East-central region will be transported to nearby regions in the Northeast (e.g., Pittsburgh) than to regions farther away (e.g., Maine). Our assumptions here about the percent of NOx that is transported to the Northeast represent an average impact across the entire Northeast region.

the Northeast States are expected to produce roughly 232 thousand tons of NOx emissions. Therefore, the amount of ozone transported from the East-central power plants could be roughly one to three times as much as that generated by the NOx emissions from the power plants located in the Northeast.

6.2 The Costs of Controlling NOx Emissions in the Northeast

We then identify the options available for reducing NOx emissions in the Northeast. Under most scenarios the potential NOx emission reductions from Northeast power plants are not sufficient to offset all of the ozone that is transported from the East-central power plants, so we investigate options for reducing NOx from other sectors of the economy. The details of our control cost assumptions for the non-utility sectors are provided in Appendix B.

A summary of our Northeast NOx control cost assumptions is provided in Table 6.1.[13] These costs represent the control options available after the various sectors have already reduced NOx emissions down to the level required by the EPA budgets in the SIP Call. As indicated in Table 5.1 above, the Northeast could reduce NOx emissions in the electricity sector by roughly 68 thousand tons/year, by lowering the average emission rate from 0.15 to 0.10 lb/MMBtu. These reductions would cost an average of $1,717 per ton.

The other sectors that create NOx emissions are characterized as point sources, area sources, and motor vehicles. We rely upon OTAG information as the primary source for estimates of NOx control costs in these sectors (Pechan). As indicated in Table 6.1, the average cost of controlling NOx from these sectors is significantly greater than from the electric utility sector.

Table 6.1 NOx Reductions Available in the Northeast From Utility and Non-Utility Sectors, After the EPA SIP Call Budgets Have Been Met.

	Potential reduction (1000 tons/year)	Average Cost Low Case ($/ton)	Average Cost High Case ($/ton)
Electric Utilities	68	1,717	1,717
Point Sources: Industrial	56	5,000	7,000
Point Sources: Incinerators	7	5,000	7,000
Point Sources: Other Industrial	24	5,000	7,000
Area Sources: Industrial	67	5,000	7,000
Motor Vehicles	235	6,800	11,500
Area Sources: Off-Road Diesel Fuel	6	8,000	23,000
Area Sources: Off-Road Gasoline	5	10,000	10,000
Total Potential Reductions	468	—	—

Source. See Appendix B. These reductions and costs represent those available after the Northeast States achieve the NOx budgets proposed in the EPA SIP call. Note that this table only lists options identified by OTAG. There are, however, additional cost-effective measures which may have not been considered by OTAG, such as heavy-duty diesel controls, that win be feasible options for additional NOx reductions.

Figure 6.1 provides a graphical representation of the costs of controlling NOx in the Northeast from the various sectors of the economy. The control options are presented in order of the lowest to highest cost, beginning at the left and moving to the right. The X-axis indicates the cumulative volume of NOx reductions available from each sector. The Y-axis indicates the average costs (in $/ton) required to achieve the associated volume of reductions.[14]

Figure 6.1 indicates that the majority of NOx emission reductions in the Northeast is available from point sources (at $5,000 to $7,000/ton), and motor vehicles (at $6,800 to $11,500/ton). The extent to which these NOx reductions would be used to offset ozone transported from the East-central region depends upon the transport assumptions:

In our Low Transport Case, the Northeast will have to offset the equivalent of roughly 305 thousand tons of NOx per year from the East-central region, which can be done by utilizing additional NOx controls from the electric utility sector, the point source sectors, and part of the motor vehicle sector.

[13] We do not consider opportunities for reducing VOC emissions in the Northeast. Regional scale modeling indicates that reductions of VOC emissions are likely to affect only local ozone formation, with relatively little impact on transported ozone.

[14] In practice, each sector offers a number of NOx control options, each with costs that may be above or below the averages presented here.

In the Medium Transport Case, the Northeast will have to offset the equivalent of roughly 457 thousand tons of NOx emissions from the East-central region, which requires essentially all of the control cost options presented in Table 6.1.

In the High Transport Case, the Northeast will have to offset the equivalent of roughly 686 thousand tons of NOx emissions from the East-central region, which would require roughly 218 thousand tons of reductions beyond those presented in Table 6.1.

6.3 The Economic Impact of NOx Transported From East-Central Power Plants

We use the data in Table 6.1 and Figure 6.1 to-estimate the economic impact upon the Northeast as a consequence of transported ozone. Our analysis is summarized in Table 6.2. The public health impacts of not attaining the ozone standard in the Northeast are not considered in this report.

In the Title IV Only Scenario, the Northeast States would have to reduce local NOx emissions by 305 thousand tons per year under our Low Transport Case. Roughly 68 thousand tons of NOx reduction could be achieved by installing additional controls on Northeast power plants (our Beyond EPA Budget Scenario). At an average cost of roughly $1,717 per ton, these NOx reductions from the electricity sector cost a total of approximately $117 million.

The remaining 237 thousand tons of NOx would have to be obtained from sources in other sectors. This amount of reduction could be achieved from point sources and motor vehicles, at an average cost of $5,600 to 8,500 per ton, requiring a total cost of $1.3 to $2.0 billion. The total economic impact imposed upon the Northeast States under the Title IV Only Scenario and the Low Transport Case would therefore be roughly $1.4 to $2.1 billion.

Table 6.2 Control Costs in the Northeast Due to NOx Emissions from East-Central Power Plants

	Low Transport	Medium Transport	High Transport
Title IV Only Scenario: (East-Central NOx = 0.50 lb/MMBtu)			
Total Emissions from East-Central Power Plants (1000 ton/year).	1,525	1,525	1,525
Emission transport from East-Central to NE (1000 ton/year).	305	457	686
NOx Reductions from NE Power Plants (1000 ton/year).	68	68	68
NOx Reductions from Other NE Sectors (1000 ton/year).	237	389	618
Average Cost of NOx Reductions from NE Power Plants ($/ton).	1,717	1,717	1,717
Average Cost of NOx Reductions from Other NE Sectors ($/ton).	5,600–8,500	6,100–9,700	>7,500
Total Cost of NOx reductions (billion $/year)	1.4–2.1	2.5–3.9	>3.9
EPA Budget Scenario: (East-Central NOx rate=0.15 lb/MMBtu)	454	454	454
Total Emissions from East-Central Power Plants (1000 ton/year)	91	91	91
Emission transport from East-Central to NE (1000 ton/year)	91	136	205
NOx Reductions from NE Power Plants (1000 ton/year)	68	68	68
NOx Reductions from Other NE Sectors (1000 ton/year)	23	68	136
Total Cost of NOx reductions (billion $/year)	0.2–0.3	0.5–0.6	0.8–1.1

In the Medium Transport Case the Northeast would have to achieve reductions in local NOx emissions of 457 thousand tons. This requires utilizing almost all of the control options listed in Table 6.1 and Figure 6.1, and therefore causes a much higher total cost ranging from $2.5 to $3.9 billion.

In the High Transport Case the Northeast would have to achieve reductions in local NOx emissions of 868 thousand tons. This requires utilizing all of the control options listed in Table 6.1 and Figure 6.1, as well as 281 thousand tons of additional NOx reductions. However, it is not clear whether there will be many additional sources of NOx reductions beyond those identified in Table 6.1 Consequently, it may

not be possible for the Northeast States to offset the full amount of ozone transported in from the East-central sources. If such reductions are available, they will most likely cost more than those reductions assumed in the Medium Transport Case. We therefore simply note in Table 6.2 that the total cost of NOx reductions in the High Transport Case will be greater than $3.9 billion per year.

In sum, the economic impact on the Northeast could range from $1.4 to over $3.9 billion per year, if the East-central sources do not meet the EPA SIP call budgets. To put these costs in perspective, the Northeast States will have to incur roughly $354 million to reduce their average emission rates from today's level to the 0.15 lb/MMBtu level. Thus, the transport of NOx and ozone from the East-central region creates an economic impact on the Northeast that could be anywhere from roughly four to over ten times as much as its own costs required to achieve the budget levels proposed by the EPA.

Our EPA Budget Scenario assumes that the East-central sources reduce their NOx emissions to the levels required in the EPA SIP call. In this scenario the economic impact on the Northeast would be considerably smaller. In the Low Transport Case, all of the transported ozone could be offset through reductions in the electric utility sector, for a total cost of $0.2 to 0.3 billion. In the Medium Transport Case, the transported ozone would be offset by equal amounts of emissions from the utility and point sources, resulting in a total cost of $0.5 to $0.6 billion. In the High Transport case, the costs could be as high as $0.8 to $1.1 billion.

The difference between the costs of the Title IV Scenario and the EPA Budget Scenario indicates the economic impact that the East-central utilities are likely to place on the Northeast as a consequence of not meeting the budgets in the EPA SIP call. In our Low Transport Case this difference is roughly $1.2 to 1.9 billion, and in the Medium Transport Case it is roughly $2.0 to $3.3 billion. In the High Transport Case, it will be significantly higher.

6.4 Limitations, Uncertainties and Approximations

Our results should be seen as approximate illustrations of the costs of offsetting ozone transported from the East-central region. The complexity of the issue makes accurate calculations challenging. The two greatest uncertainties in our analysis are the amount of ozone transported from the East-central region, and the costs of controlling NOx from utility and non-utility sectors. The more important uncertainties in our analysis are addressed in turn below.

The transport of ozone. We believe that our assumption of 20 to 45 percent represents a reasonable range of likely ozone transport scenarios. (Please refer to the companion document prepared by NESCAUM.) Evidence indicates that in some regions of the Northeast the transport will be significantly greater. In some regions it will be lower. On average, our assumptions cover the plausible range of ozone transport.

Non-utility NOx control costs. We have used conservative assumptions for the cost of controlling NOx emissions from non-utility sectors. Many of the reductions will be available from point sources, which OTAG has estimated to cost greater than $5,000 per ton. In some cases, they may cost significantly more than this. We have assumed that these reductions will cost only $5,000 to $7,000 per ton.

Utility NOx control costs. We have not accounted for some important electricity sector NOx reduction opportunities, such as fuel-switching, coal-to-gas repowering. or coal unit retirement. These opportunities might be more cost-effective than some of the utility control costs assumed here—particularly if the benefits of reducing other pollutants (e.g., CO_2) are accounted for.

Improved efficiencies and economies of scale. Our assumptions for NOx control costs in both the electric sector and the non-utility sectors might overstate the actual control costs, as a consequence of efficiencies that might be achieved over time. As industries come under increasing pressure to reduce NOx emissions, they can be expected to identify new control options and to achieve reductions more efficiently than in the past. In addition, increased demand for NOx control technologies may allow for them to be produced with increased economies-of-scale.

Annual versus seasonal control costs. Our analysis estimates the costs of achieving annual NOx reductions from the electric utility sector, as opposed to the seasonal reductions required in the EPA SIP call. Annual NOx reductions are likely to be more expensive than seasonal reductions, because some of the power plant NOx controls might not have to be operated during the off-season periods. However, we believe that using annual control costs does not overstate our control cost results significantly, and does not affect our overall conclusions; The control costs we assume for reducing NOx from non-utility sources are based on seasonal control costs; it is only the utility sources that are based on annual costs. The non-utility sources represent the greatest contribution to the total control costs in our analysis, both

in terms of dollars per ton and number of tons. For example, in our Medium Transport Case the non-utility control costs represent 95 to 97 percent of the total cost of NOx reductions reported in Table 6.2.

Transported ozone from non-utility sources in the East-central region. Our estimates of the costs imposed upon the Northeast only present a portion of the economic impact of NOx transport, because they only account for the NOx emissions from East-central electric power plants. As indicated in Table 4.1 above, power plants are responsible for only about one-half of the total NOx emissions from the East-central region. Consequently, we have accounted for only a portion of the transported ozone problem. The NOx emissions from other sectors in the East-central region will impose additional costs on the Northeast States.

Insufficient NOx control measures in the Northeast. As indicated in Figure 6.1, the Northeast States may have to apply nearly all currently known NOx controls to offset the volume of the ozone transported from the East-central region. In the High Transport Case, there is unlikely to be enough NOx control options available to offset the transport of ozone generated from all East-central sources.[15] Consequently, the economic and residual environmental costs could be much higher than we have identified here.

Low-cost NOx control measures are needed to address local NOx emissions first. OTAG modeling has indicated that the Northeast States might not be able to reach attainment of the 1-hour ozone standard—even after they meet the NOx budgets proposed in the EPA SIP call. Therefore, they may need to implement some of the control options presented in Table 6.1, regardless of whether there is any ozone transported from the East-central region. A more appropriate estimate of the economic impact caused by transport would therefore assume that such options are not available for offsetting transported ozone. Consequently, the control options that are used to offset the transported ozone will be more expensive—if they are available at all.

In sum, our analysis generally indicates that the transport of ozone and its precursors from the electricity sector in the East-central region is likely to require the Northeast States to implement a large portion of the available local NOx control options, including control options from all NOx-emitting sectors. This will require the Northeast States to incur costs on the order of billions of dollars per year, and might still leave some regions in the Northeast in nonattainment of the ozone standard.

If the East-central sources achieve the NOx reductions proposed in the EPA SIP call, then this economic impact will be significantly reduced. Even then, however, the impact imposed upon the Northeast will still be on the order of hundreds of millions of dollars, if not more. Even in this scenario, the transport of ozone will make it more difficult for the Northeast States to reach attainment of the ozone standard.

7. Conclusions

Our analysis finds that there is a clear need to reduce the inter-regional transport of ozone and its precursors. Simply put, ozone is a regional problem with regional implications, and upwind States cannot act without regard for the NOx and ozone that is transported out of their borders.

NOx emissions from East-central power plants significantly contribute to the nonattainment of ozone standards in the Northeast—in addition to contributing to the local ozone problem in the East-central region. Not only does this East-central contribution threaten public health by preventing the Northeast States from reaching attainment, it also requires the Northeast States to incur significantly higher NOx control costs than they would in the absence of transported ozone.

Based on OTAG modeling to date, the Northeast States will likely have to take additional aggressive measures to reach attainment of the ozone standard even after the EPA NOx SIP call is fully in place throughout the eastern United States. As this study shows, the most effective approach is to implement low-cost upwind NOx controls so that a greater portion of the additional local measures can be applied toward reaching attainment, rather than compensating for outside transport. Therefore, the East-central sources should be required to meet the State NOx emission budgets in the EPA's proposed rulemaking.

The EPA NOx SIP call is a good first step in addressing the regional ozone problem in the eastern United States. Even at the EPA NOx budget levels, however, upwind sources will continue to impose significant costs on downwind States, and will continue to impede the ability of downwind States to reach attainment. The U.S. EPA and the States should monitor the ozone transport problem over time to

[15] While there is likely to be some NOx reduction measures available in the Northeast beyond those presented in Table 6.1 and Figure 6.1, they are likely to be increasingly expensive and difficult to find.

determine what additional measures might be necessary to reduce ozone transport further beyond the EPA NOx SIP call budgets.

REFERENCES

Andover Technology Partners 1998. Status Report on NOx: Control Technologies and Cost Effectiveness, Submitted to Northeast States for Coordinated Air Use Management, Draft Report, January.

Energy Information Administration 1997. Annual Electric Generator Data: 1996, Form EIA–860.

Environmental Protection Agency (EPA) 5/1998. Staff Paper on Gasoline Sulfur Issues, Office of Mobile Sources, EPA420-R–98–004 May 1.

EPA 1997. Summary Emission Reports: 1996, Acid Rain Division, Year-to-Date and Quarterly.

EPA 11/1997. Finding of Significant Contribution and Rulemaking for Certain States in the Ozone Transport Assessment Group Region for Purposes of Reducing Regional Transport of Ozone; Proposed Rule, 40 CFR Part 52, Federal Register, November 7.

EPA 9/1997. Proposed Ozone Transport Rulemaking Regulatory Analysis, Office of Air and Radiation, September.

EPA 7/1996. Analysis of Electric Power Generation Under the Clean Air Act Amendments, July.

Northeast States for Coordinated Air Use Management (NESCAUM) 1997. The Long-Range Transport of Ozone and Its Precursors in the Eastern United States, March.

Pechan & Associates 1997. OTAG Cost Parameters Applied To Non-Utility Strategies To Reduce Ozone Transport, Prepared for U.S. EPA, Contract No. 68-D4–0107, Pechan Report No. 97.05.001/1150.020, May 29.

Synapse Energy Economics 1998. Grandfathering and Environmental Comparability: Air Emission Regulations and Electricity Market Distortions, prepared for the National Association of Regulatory Utility Commissioners, with the Global Development and Environment Institute, Forthcoming.

Utility Data Institute 1997. 1996 Production Costs Operating Steam-Electric Plants, UDI–2011 –97, September.

APPENDIX A. NOX CONTROL OPTIONS FOR THE ELECTRIC UTILITY SECTOR

Table A.1 presents a summary of the NOx control technologies for achieving NOx reductions in the electricity sector. All of the data in Table A. 1 are taken from the same study (EPA 1996) that EPA used in its ozone transport rulemaking (EPA 9/1997).

The majority of the NOx controls available are designed for coal plants, due to their high emission rates. Some controls are applied in the combustion process itself, while others are applied after the fuel has been burned. On any one unit it is possible to apply both combustion and post-combustion controls. In such case the removal rates are multiplicative.

It is important to note that in practice, the cost of these control measures, and the amount of NOx removal, might vary considerably from the costs presented in Table A.1. The cost might depend upon the unique characteristics of a unit's design, location, and operating patterns. For example, the costs of the few SCR technologies installed to date have varied significantly (Andover Technology Partners 1998).

Figure A.1 indicates the removal rates from some of the key NOx control options. It presents the NOx removal rate and control cost for a typical coal plant operating at 50 percent capacity factor, for six different combinations of combustion and post-combustion controls. The greatest opportunity for removing NOx emissions can be found by combining 10w-NOx burners with SCR controls.

The cost of reducing NOx emissions (in $/ton) will vary depending upon the extent that a unit operates. Figure A.2 presents the NOx control costs for three control technology options, for a typical coal plant at various levels of plant operation. The control costs increase with lower levels of plant operation. The low-NOx burner represents the least-cost control option available, while the combination of low-NOx burners and SCR controls provides the greatest level of NOx removal.

In our economic analysis we have levelized the capital costs over 30 years using a fixed charge factor of 12 percent, in order to present total control costs in annual terms. All costs presented in this study are in 1995 dollars. We do not account for increases or decreases in NOx control costs beyond inflation.

The general approach in our economic analysis is to identify the NOx control technologies that would likely be adopted on a plant-by-plant basis to meet various lev-

els of NOx standards in the Northeast and East-central regions. We begin with a snapshot of control technologies that are in place today. We then look at increasingly stringent levels of NOx standards, and identify the least-cost control technologies that would be installed and the costs that would be incurred in meeting them. This allows us to develop curves indicating the average and marginal costs of NOx controls in the two regions.

APPENDIX B. NOX CONTROL OPTIONS FOR NON-UTILITY SECTORS

We rely upon the OTAG information for the primary source of data on NOx control options for non-utility sectors (Pechan 1997). This information includes inventories of NOx control costs by sector and by State. The inventories include different groupings of control options, to achieve different degrees of NOx reductions. These groupings are referred to as Level 1, Level 2 and Level 3, with Level 3 being the most stringent.

We seek to identify those NOx options that can be applied in the Northeast in the EPA Budget Scenario—i.e., after the Northeast States have meet the NOx budgets proposed in the EPA SIP call. To identify the NOx options available in this scenario, we have relied upon Round 3, Run I of the OTAG modeling.[16] This run is comparable to the NOx reduction requirements of the NOx SIP call.

The OTAG runs model the NOx control options for point sources (both utility and non-utility), area sources and motor vehicles. The results for Round 3, Run I are summarized in Table B. 1, and are described below.

Non-Utility Point Sources

From the Run 2, Round 9 OTAG inventory,[17] three general emission sectors are identified.[18] These are industrial and other point sources, incinerators, and other industrial processes. These are assumed to be already controlled at OTAG Level 2 under the NOx SIP call. On average, Level 2 is assumed to be a 55 percent reduction from the initial OTAG baseline inventory. Going beyond Level 2 to Level 3 is assumed to be an average 75 percent reduction from the OTAG baseline inventory. Therefore, going beyond the NOx SIP call (Level 2 controls) to Level 3 will mean an average additional 44 percent reduction beyond Level 2. The total available reductions in the Northeast from the industrial, incinerators, and other industrial categories are 56, 7, and 24 thousand tons per year beyond the EPA SIP call levels.[19]

Using a cost matrix derived by OTAG, all Level 3 controls are listed as greater than 5,000 dollars/ton for non-utility point sources. Using 5,000 dollars/ton as the lower limit, the total costs of relying upon each of the non-utility point source sectors would require an annual cost of $435 million.

Area Sources

NOx area emissions are split into three general categories—industrial and other combustion sources, off-road diesel, and off-road gasoline. For industrial and other combustion area sources, the same approximation to estimate additional NOx reductions is used as for the non-utility point sources (i.e. 44 percent beyond Level 2 controls used in Run []). For off-road diesel, the control measure is going from 50 octane diesel to 55 octane diesel.[20] This will result in a 3 percent NOx reduction based on

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[16] A State-level "Tier 2" emissions inventory description broken down by emission sector is found through OTAG's website html:://www.iceis.mcnc.org/OTAGDC/index.html.

[17] The Round 3, Run I, NOx point source inventory was missing from the OTAG website. As a surrogate, the NOx point source inventory from Round 2, Run 9 was used. In this inventory, NOx power plant controls were equivalent to Run I. For non-utility point source NOx emissions, the inventory was equivalent to Run I for boilers >250 MMBtu. The Round 2, Run 9, inventory was more stringent than Run I for boilers <250 MMBtu, but these are not a significant portion of the total NOx inventory.

[18] Costs are based on an OTAG cost matrix that does not exactly correlate with the emission sectors of the Tier 2 OTAG inventories. Therefore, several general, rather than specific, emission sectors are identified, and average reductions across the general sectors are estimated based on the control effectiveness numbers given in the OTAG cost matrix.

[19] The OTAG model runs provide the NOx emissions and reductions in terms of tons per Summer day. Throughout this study, we use an approximate scaling factor of 300 to translate these into tons per year. The scaling factor is less than 365 because the emissions tend to be highest on Summer days.

[20] Additional strategies exist to achieve NOx reductions from off-road diesels, but were not explicitly included in the OTAG cost estimates. One option is to accelerate the introduction of proposed non-road diesel engine emissions standards between 2000 and 2008. The proposed emissions standards for off-road diesels will result in large NOx reductions over the next two decades. Nationally, between one to two million tons of NOx a year (beginning in 2010) will be reduced as a result of introduction of the standards at a cost of less than $1,000 per ton.

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figures from Ethyl Corporation. For off-road gasoline, more uncertainty is involved. The presumed control measure is California reformulated gas (RFG) II. This is an average 40 ppm sulfur gasoline. If the impact of Cal RFG II on off-road gasoline vehicles is comparable to older conventional cars (Tier 0), then the impact might be a 10 percent reduction in NOx, based on an EPA staff report (EPA 5/1998). The total available reductions in the Northeast from the area industrial, off-road diesel and off-road gasoline are 67, 6, and 5 thousand tons per year beyond the EPA SIP call levels.

Level 3 costs for industrial and other combustion area sources are listed in the OTAG cost matrix as greater than 5,000 dollars/ton. For off-road diesel using 55 octane fuel, the OTAG cost matrix gives a range of 8,000–23,000 dollars/ton. This range is used to set a low and high cost estimate range. For off-road gasoline, an estimate of 10,000 dollars/ton is used. This estimate is taken from the calculation described below for mobile source costs. It basically is chosen as a cost that falls within the range described below. While this is a rough estimate, the potential reduction of 5 thousand tons per year from this sector make the overall Northeast cost estimate relatively insensitive to this particular emissions sector.

Motor Vehicles

The control measure assumed for motor vehicles is going from Federal RFG (150 ppm sulfur) to Cal RFG II (40 ppm sulfur). Run I assumes national low emission vehicles (NLEV) in the Northeast. Based on an EPA staff report for 40 ppm sulfur gasoline, an average reduction in NOx of 55 percent from NLEV could be expected (EPA 5/1990). A reduction of 55 percent is used in this analysis, but it is an overestimation of available reductions in the Northeast because it does not take into account non-LEV vehicles in the Northeast in 2007. Therefore, 235 thousand tons per year represents a generous estimate of available NOx reductions from mobile sources in the Northeast beyond the NOx SIP call.

The cost of Cal RFG II in the Northeast is estimated as follows. Based on EPA's staff report on sulfur in gasoline, an NLEV car will emit 0.50 g/mile at 100,000 miles when using fuel with 150 ppm sulfur. :A vehicle fleet average of 25 miles/gal in 2007 is assumed (this is optimistic and ignores sport utility vehicles and heavy duty trucks). From this, the NOx tons/gal can be calculated. From this value, a 55 percent NOx reduction is estimated by going from 150 ppm sulfur gasoline to 40 ppm sulfur fuel. An EPA staff report gives costs of 40 ppm sulfur (Cal RFG II) gasoline in a range of 5.2–8.7 cents/gal. From this we calculate a low cost estimate of $6,845/ton, and a high cost estimate of $11,452/ton.

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LIFTING THE VEIL OF SMOG: WHY A REGIONAL OZONE STRATEGY IS NEEDED IN THE EASTERN UNITED STATES

(by Paul J. Miller, Northeast States for Coordinated Air Use Management)

In Bertolt Brecht's play The Life of Galileo, dogma clashes with modern science during a scene in which two representatives of the Inquisition visit the workroom of Galileo. The Inquisitors are there to look through a telescope at the recently discovered moons of Jupiter. The claim that moons orbit Jupiter, or any other planet for that matter, is heretical because it contradicts the view that all celestial objects revolve around the earth. The two representatives insist on debating Galileo over the question Can such planets exist? Galileo responds that all they need do is look through his telescope tube to see for themselves. His plea is met with the retort, If your tube shows something that cannot be there, it cannot be an entirely reliable tube, would you say?

So seems to be the current state of debate over the long-range transport of ground-level ozone (or smog) in the eastern United States. The U.S. Environmental Protection Agency (EPA) recently promulgated a regional plan to reduce the formation and transport of ozone within 22 eastern States and the District of Columbia.[1] EPA's regional ozone plan is not without controversy. A number of States along with utility and business groups have filed lawsuits challenging it, and Congress may get involved in reviewing the plan. Much of the criticism focuses on computer modeling

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In addition, the use of some types of electrically powered off road equipment can reduce NOx in a cost effective manner. Use of natural gas fuel can also greatly reduce off-road vehicle NOx emissions. Cost estimates prepared for natural gas highway vehicles suggest that NOx reductions can be also be achieved in a cost effective manner from off-road vehicles.

to dispute the notion that upwind pollution sources significantly contribute to smog problems experienced far downwind. Within this computer-generated realm, however, reference to real world observation is sometimes ignored, perhaps because observation will contradict what one would like to believe about the world around us.

Because computer modeling is inherently limited by the lack of perfect knowledge of the natural world, interpretation of modeling results needs to be grounded in real-world observations.[2] The purpose of this article is to present a brief synopsis of observed ozone transport described in the peer-reviewed scientific literature over the past 25 years. Part of this article's focus is on fossil fuel power plants because EPA predicates its regional ozone plan largely upon reductions from these pollution sources. Even so, automobiles and other mobile sources, as well as smaller stationary sources, can also be major contributors to regional ozone formation. EPA's plan does not preclude State efforts to control pollution sources other than power.2 plants, but EPA believes the control costs will be relatively more expensive.

A reading of the peer-reviewed scientific literature finds that researchers have long recognized the regional nature of the ozone problem across the eastern United States. Researchers have observed regional ozone formation and transport not just from the Midwest to the Northeast, but in other areas throughout the eastern United States. In the specific context of ozone transport from the Midwest to the Northeast, the observed transported ozone levels are at such high levels as to make it impossible as a practical matter for the Northeast to achieve air quality standards without implementing upwind controls.

History of regional ozone research in the eastern United States

As summarized in a report from the National Research Council, the major characteristics of high ozone episodes were first identified during the early 1970's in rural field studies sponsored by the U.S. Environmental Protection Agency.[3] Researchers described periods of high ozone (>0.08 parts per million) lasting several days and spanning areas larger than 100,000 km^2 in the eastern United States. In one case, researchers described a river of ozone extending from the Gulf Coast, throughout the Midwest, and up to New England.[4] High ozone levels were also observed transported out of the U.S. Great Lakes region into southern Ontario.[5]

An example of a recent large ozone episode occurring across much of the east-central United States is shown in the map of Figure 1. The map displays ozone concentrations measured on September 13, 1998 at monitoring stations throughout the East. Ozone levels above the Federal 8-hour health standard of 0.08 parts per million (ppm) were observed across large sections of the eastern United States in places far removed from urban centers. This is typical of severe ozone episodes in the East when summertime high pressure systems move from west to east across the eastern United States, picking up and transporting air pollution along the way.[6]

Power plants are major contributors to regional smog

EPA's regional ozone plan relies on reducing emissions of nitrogen oxides (NOx), an important precursor of ozone formation in the atmosphere. NOx is formed during the combustion of fossil fuels by power plants as well as motor vehicles and industrial sources.

Studies show that emissions of NOx from fossil fuel power plants play a major role in the formation and transport of regional ozone. For example, high ozone levels formed and transported within power plant plumes have been observed in Maryland,[7] from Wisconsin into Michigan,[8] from Tennessee toward Indiana,[9] from Missouri toward Chicago,[10 11] and across southern Alabama and Mississippi.[12] These studies show that NOx in power plant plumes produces ozone approaching or exceeding health standards, and the ozone can travel long distances into neighboring States. Two of the studies also found that individual power plant plumes can produce ozone on a regional scale comparable to the amount of ozone generated in an urban plume.[11 12] These two studies demonstrate that power plant plumes and urban plumes both contribute to downwind ozone transport.

Within the Ohio River Valley, there is a large and persistent area of high ozone during the summer months relative to air in other parts of the country.[13] In this region, winds intermingle ozone pollution from different power plant plumes (as well as other pollution sources). Because of this mixing, a large reservoir of ozone is formed across much of the east central United States (Figure 2). Somewhat surprisingly, people living in the Ohio River Valley are exposed to higher average smog levels over a more prolonged period of time than people living in Chicago or Boston.

The areas of the eastern United States experiencing chronically high smog levels are also the same areas where many large fossil fuel power plants are located (Figure 3). A single power plant can emit as much NOx in 1 year as all the cars and trucks in a large metropolitan area. For example, the General James M. Gavin

power plant in rural southern Ohio emitted over 110,000 tons of NOx pollution in 1996.[14] By comparison, all highway vehicles (cars and trucks) in the Boston-Lawrence-Worcester, Massachusetts/New Hampshire ozone nonattainment area emitted about 125,000 tons of NOx in 1996.[15] When many power plants are grouped together as in the Ohio River Valley, they will emit as much NOx pollution as a major metropolitan region extending over several hundred miles.

Ozone is transported out of the Ohio River Valley

The movement of ozone out of the Ohio River Valley was seen as early as 1979. During early August 1979, scientists tracked a mass of ozone leaving central Ohio, crossing Pennsylvania and southern New York, and entering into the Northeast Corridor a distance of over 450 miles.[16] When this mass of air from the Ohio River Valley entered into the Northeast Corridor, it contained about 0.09 ppm of ozone. By comparison, the Federal 8-hour ozone standard is 0.08 ppm and the 1-hour standard is 0.12 ppm. With transported ozone levels approaching 0.09 ppm, it is difficult to conceive as a practical matter how an area such as the Northeast can achieve health standards on its own without additional control measures applied in upwind regions.

As the persistent ozone reservoir re-establishes itself every summer in the Ohio River Valley, large amounts of ozone continue to be transported into the Northeast from the west. During the summer of 1995, the North American Research Strategy for Tropospheric Ozone Northeast (NARSTO-NE) conducted aircraft measurements of ozone in air masses along the western edge of the Northeast Corridor. During overnight hours, scientists measured ozone levels above Shenandoah, VA, Gettysburg, PA, Poughkeepsie, NY and other locations in excess of 0.10 ppm (two ozone profiles above Poughkeepsie, NY are shown in Figure 4).[17 18] During the night, ozone can not have been formed locally (no sunlight is present to initiate the formation of ozone), so it must have been transported during the pre-dawn hours. Upper air flow direction during the highest ozone days (July 12–15, 1995) indicated that the polluted air masses were arriving from the west.[18] Later during the day, the transported ozone trapped aloft mixed down to the earth's surface, significantly contributing to ozone concentrations experienced far downwind of the ozone's source region. High concentrations of ozone trapped aloft during overnight hours were observed in several studies to significantly contribute to ground-level ozone concentrations experienced later during the day.[17 19 20]

The field studies are consistent with evaluations of air mass trajectories associated with the highest ozone levels observed in southern New England. In a recent study, researchers found that the highest ozone levels observed at a site in rural western Massachusetts are associated with air masses arriving from the west.[21] Based on an analysis of air masses arriving in western Massachusetts, the researchers concluded:

> Anthropogenic pollutants (combustion-derived products) were highest under [southwest] flow conditions, which were generally warm, moist, and relatively cloudy. This is indicative of warm sector transport. The highest O3 concentrations did not occur under these conditions, which had a low O3 production efficiency. Instead, the highest average summer O3 occurred under [west] flow. . . which delivered well-aged air masses with high O3 production efficiency. This implies an important contribution of advected pollutants from Midwest source regions.

The large ozone reservoir in the Ohio River Valley returns each summer with little abatement. Researchers have found no significant downward trend in regional ozone levels from 1980 to 1995.[22] While urban NOx levels have decreased (as have urban ozone levels in a few large metropolitan areas) due in large part to pollution controls on automobiles, regional ozone and NOx levels have not significantly changed. In contrast to a decrease in NOx pollution emitted by cars, regional NOx emissions from power plants increased by 3 percent between 1987 and 1996.[23] The lack of regional NOx reductions is significant because it is well established that regional ozone formation over the eastern United States is limited primarily by the supply of NOx.[24 25 26 27 28 29 30]

Health and ecological problems caused by regional NOx pollution

Medical researchers have observed that prolonged exposures to ozone at concentrations as low as 0.08 ppm for several hours or over a period of several days produce health effects similar to shorter exposures at higher ozone concentrations.[31 32] The observed detrimental health effects include:

- increased airway responsiveness in the general population
- increased severity and incidence of asthma attacks
- Increased severity and incidence of respiratory infections
- Increased prevalence of chronic respiratory symptoms

• Development of chronic respiratory bronchiolitis.

The recent change in the Federal ozone health standard from a 0.12 ppm 1-hour concentration to a 0.08 ppm 8-hour concentration is intended to reduce the observed health impacts from prolonged exposures to lower ozone concentrations. As described previously, such chronic long-term ozone levels are often observed over large areas of the eastern United States.

In addition to public health impacts, transported smog and NOx affect natural resources. Scientists are raising concerns that prolonged ozone exposure can increase the death rates of trees in forests of the Appalachian region.[33] This could alter the long-term tree composition of eastern forests, thereby affecting the forests value as timber and recreational resources.

Agricultural productivity can also be affected by regional ozone pollution. Eastern North America has been identified as a region where the correlation between agriculture and fossil fuel burning may lead to reductions in crop yields due to prolonged ozone exposure during the growing season.[34]

Aside from their role in ozone formation, NOx emissions also contribute to ecologically damaging acidic precipitation on forests and nitrogen deposition in bays and estuaries. Nitrate deposition is highest in the northeastern United States directly downwind of major NOx pollution sources in the Ohio River Valley (Figure 5).

Conclusion

Based on observations of high ozone levels throughout the eastern United States, EPA's recent plan to reduce NOx emissions in 22 eastern States and the District of Columbia makes sense. On a regional scale, ozone formation depends largely upon the presence of NOx, a byproduct of fossil fuel combustion. The largest individual sources of NOx are fossil fuel power plants, and numerous studies have observed significant amounts of ozone being formed and transported within power plant plumes.

When a downwind area already produces harmful levels of ozone from its own pollution sources, transported ozone from upwind regions will hinder efforts to improve local air quality. Field studies have recorded ozone levels approaching or exceeding 0.09 ppm in air masses traveling long distances in the eastern United States. Whether a downwind area is subject to the 1-hour ozone health standard (0.12 ppm) or the 8-hour ozone standard (0.08 ppm), the observed levels of transported ozone are significant obstacles to achieving clean air.

While the scientific justification for a regional ozone approach has existed for some time, EPA's NOx reduction strategy is the subject of continued debate. Many States, notably Tennessee and a number of Northeastern States, support EPA's approach, while other States, primarily in the Midwest and Southeast, oppose it. Interestingly, several States suing to stop EPA's regional smog plan would receive some of its largest benefits due to the persistent nature of ozone within their own borders (e.g., Indiana, North Carolina, Ohio, Virginia, West Virginia). Ultimately, all the eastern States may come to see that the resiliency of the regional ozone problem is a shared concern. After all, as Bertolt Brecht writes in The Life of Galileo, Once something is seen, it cannot be made to be unseen.

About the Author

Paul J. Miller is Senior Scientist with the Northeast States for Coordinated Air Use Management (NESCAUM) in Boston, MA. NESCAUM is a regional organization providing technical and policy advice to the air quality agencies of eight northeastern States. Dr. Miller received a Ph.D. in chemical physics from Yale University and was a National Research Council Associate at the Joint Institute for Laboratory Astrophysics, University of Colorado. Prior to NESCAUM, he was a Visiting Fellow at the Center for Energy and Environmental Studies, Princeton University.

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[1] Federal Register, October 27, 1998, Volume 63, pp. 57,355–57,538.

[2] For a discussion of the logical limitations of models in the earth sciences, see Oreskes, N.; Shrader-Frechette, K.; Belitz, K. "Verification, validation, and confirmation of numerical models in the earth sciences," Science, 1994, 263, 641–646. . 8

[3] National Research Council. "Rethinking the Ozone Problem in Urban and Regional Air Pollution," National Acad. Press (Washington, DC), 1991, pp. 98–105.

[4] Wolff, G.T; Lioy, P.J. "Development of an ozone river associated with synoptic scale episodes in the eastern United States," Envtl. Sci. & Technol., 1980, 14, 1257–1260.

[5] Mukammal, E.I.; Neumann, H.H.; Gillespie, T.J. "Meteorological conditions associated with ozone in southwestern Ontario, Canada," Atmos. Envt., 1982, 16, 2095–2106.

[6] Logan, J.A. "Ozone in rural areas of the United States," J. Geophys. Res., 1989, 94, 8511–8532.

Continued

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[7] Davis, D.D.; Smith, G.; Klauber, G. "Trace gas analysis of power plant plumes via aircraft measurement: O3 , NOx, and SO2 chemistry," Science, 1974, 186, 733–736.

[8] Miller, D.F.; Alkezweeny, A.J.; Hales, J.M.; Lee, R.N. "Ozone formation related to power plant emissions," Science, 1978, 202, 1186–1188.

[9] Gillani, N.V.; Kohli, S.; Wilson, W.E. "Gas-to-particle conversion of sulfur in power plant plumes I. Parametrization of the conversion rate for dry, moderately polluted ambient conditions," Atmos. Envt., 1981, 15, 2293–2313.

[10] Gillani, N.V.; Wilson W.E. "Formation and transport of ozone and aerosols in power plant plumes," Annals N.Y. Acad. Sciences, 1980, 338, 276–296.

[11] White, W.H.; Patterson, D.E.; Wilson, Jr., W.E. "Urban exports to the nonurban troposphere: Results from Project MISTT," J. Geophys. Res., 1983, 88, 10,745–10,752.

[12] Ridley, B.A.; Walega, J.G.; Lamarque, J.-F.; Grahek, F.E.; Trainer, M.; Hubler, G.; Lin, X.; Fehsenfeld, F.C. "Measurements of reactive nitrogen and ozone to 5-km altitude in June 1990 over the southeastern United States," J. Geophys. Res., 1998, 103, 8369–8388.

[13] Husar, R.B. "Spatial pattern of daily maximum ozone over the OTAG region," 1996, Web address: http://capita.wustl.edu/OTAG/Reports/otagspat/otagspat.html.

[14] U.S. EPA Acid Rain Program. "1996 Emissions Scorecard," 1996, Web address: http://www.epa.gov/docs/acidrain/score96/es1996.htm, Appendix B (Table B1).

[15] U.S. EPA, National Emissions Trends Viewer 1985–1996, ver. 2.0. (July 1998).

[16] Clarke, J.F.; Ching, J.K.S. "Aircraft observations of regional transport of ozone in the northeastern United States," Atmos. Envt., 1983, 17, 1703–1712.

[17] Zhang, J.; Rao, S.T.; Daggupaty, S.M. "Meteorological processes and ozone exceedances in the northeastern United States during the 12–16 July 1995 episode," J. Applied Meteorology, 1998, 37, 776–789.

[18] Ryan, W.F; Doddridge, B.G.; Dickerson, R.R.; Morales, R.M.; Hallock, K.A.; Roberts, P.T.; Blumenthal, D.L.; Anderson, J.A.; Civerolo, K.L. "Pollutant Transport During a Regional O3 Episode in the Mid-Atlantic States," J. Air & Waste Manage. Assoc., 1998, 48, 786–797.

[19] Berkowitz, C.M.; Fast, J.D.; Springston, S.R.; Larsen, R.J.; Spicer, C.W.; Doskey, P.V.; Hubbe, J.M.; Plastridge, R. "Formation mechanisms and chemical characteristics of elevated photochemical layers over the Northeast United States," J. Geophys. Res., 1998, 103, 10,631–10,647.

[20] McElroy, J.L.; Smith, T.B. "Creation and fate of ozone layers aloft in southern California," Atmos. Envt., 1993, 27A, 1917–1929.

[21] Moody, J.L.; Munger, J.W.; Goldstein, A.H.; Jacob, D.J.; Wofsy, S.C. "Harvard Forest regional-scale air mass composition by Patterns in Atmospheric Transport History (PATH)," J. Geophys. Res., 1998, 103, 13,181–13,194.

[22] Fiore, A.M.; Jacob, D.J.; Logan, J.A.; Yin, J.H. "Long-term trends in ground level ozone over the contiguous United States, 1980–1995," J. Geophys. Res., 1998, 103, 1471–1480.

[23] U.S. Environmental Protection Agency. "National Air Quality and Emissions Trends Report, 1996," EPA 454/R–97–013, 1998, p. 17.

[24] Trainer, M.; Williams, E.J.; Parrish, D.D.; Buhr, M.P.; Allwine, E.J.; Westberg, H.H.; Fehsenfeld, F.C.; Liu, S.C. "Models and observations of the impact of natural hydrocarbons on rural ozone," Nature, 1987, 329, 705–707.

[25] Chameides, W.L., Lindsay, R.W.; Richardson, J.; Kiang, C.S. "The role of biogenic hydrocarbons in urban photochemical smog: Atlanta as a case study," Science, 1988, 1473–1475.

[26] Sillman, S.; Logan, J.A.; Wofsy, S.C. "The sensitivity of ozone to nitrogen oxides and hydrocarbons in regional ozone episodes," J. Geophys. Res., 1990, 95, 1837–1851.

[27] McKeen, S.A.; Hsie, E.-Y.; Liu, S.C. "A study of the dependence of rural ozone on ozone precursors in the eastern United States," J. Geophys. Res., 1991, 96, 15,377–15,394. . 9

[28] Chameides, W.L.; Fehsenfeld, F.; Rodgers, M.O.; Cardelino, C.; Martinez, J.; Parrish, D.; Lonneman, W.; Lawson, D.R.; Rasmussen, R.A.; Zimmerman, P.; Greenberg, J.; Middleton, P.; Wang, T. "Ozone precursor relationships in the ambient atmosphere," J. Geophys. Res., 1992, 97, 6037–6055.

[29] Trainer, M.; Parrish, D.D.; Buhr, M.P.; Norton, R.B.; Fehsenfeld, F.C.; Anlauf, K.G.; Bottenheim, J.W.; Tang, Y.Z.; Wiebe, H.A.; Roberts, J.M.; Tanner, R.L.; Newman, L.; Bowersox, V.C.; Meagher, J.F.; Olszyna, K.J.; Rodgers, M.O.; Wang, T.; Berresheim, H.; Demerjian, K.L.; Roychowdhury, U.K. "Correlation of ozone with NOy in photochemically aged air," J. Geophys. Res., 1993, 98, 2917–2925.

[30] Jacob, D.J.; Logan, J.A.; Gardner, G.M.; Yevich, R.M.; Spivakovsky, C.M.; Wofsy, S.C.; Sillman, S.; Prather, M.J. "Factors regulating ozone over the United States and its export to the global atmosphere," J. Geophys. Res., 1993, 98, 14,817–14,826.

[31] Lippman, M. "Health effects of tropospheric ozone: Review of recent research findings and their implications to ambient air quality standards," J. Exposure Analysis & Envtl. Epid. 1993, 3, 103–129.

[32] Bates, D.V. "Ozone: A review of recent experimental, clinical and epidemiological evidence, with notes on causation. Part 1," Can. Respir. J., 1995, 2, 25–31.

[33] Heck, W.W.; Cowling, E.B. "The need for a long term cumulative secondary ozone standard An ecological perspective," EM, 1997, 23–32.

[34] Chameides, W.L.; Kasibhatla, P.S.; Yienger, J.; Levy II, H. "Growth of continental-scale metro-agro-plexes, regional ozone pollution, and world food production," Science, 1994, 264, 74–77.