## **BEFORE THE ILLINOIS POLLUTION CONTROL BOARD**

IN THE MATTER OF:	)	
	)	
PROPOSED NEW CAIR SO <sub>2</sub> , CAIR NO <sub>X</sub>	)	
ANNUAL AND CAIR NO <sub>X</sub> OZONE SEASON	)	R06-2
TRADING PROGRAMS, 35 ILL. ADM.	)	(Rule
CODE 225, CONTROL OF EMISSIONS	)	
FROM LARGE COMBUSTION SOURCES,	)	
SUBPARTS A, C, D and E	)	

R06-26 (Rulemaking- Air)

## **NOTICE**

TO: Dorothy Gunn, Clerk
 Illinois Pollution Control Board
 James R. Thompson Center
 100 West Randolph, Suite 11-500
 Chicago, Illinois 60601-3218

## SEE ATTACHED SERVICE LIST

PLEASE TAKE NOTICE that I have today filed with the Office of the Pollution Control Board the <u>TESTIMONY OF GARY E. BECKSTEAD, DAVID E. BLOOMBERG, ROSTON</u> <u>COOPER, RORY DAVIS, ROBERT KALEEL, YOGINDER MAHAJAN, JAMES R. ROSS</u> <u>AND JACQUELYN SIMS</u>, of the Illinois Environmental Protection Agency a copy of which is herewith served upon you.

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

By:

Rachel L. Doctors Assistant Counsel Division of Legal Counsel

DATED: September 22, 2006 1021 North Grand Avenue East P.O. Box 19276 Springfield, Illinois 62794-9276 217.782.5544 217.782.9143 (TDD)

## THIS FILING IS SUBMITTED ON RECYCLED PAPER

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R06-26 (Rulemaking- Air)

## **TESTIMONY OF GARY E. BECKSTEAD**

## Qualifications

My name is Gary Beckstead. I am here representing the Illinois Environmental Protection Agency ("Illinois EPA") where I am the Manager of the Regulatory Unit in the Air Quality Planning Section of the Division of Air Pollution Control in the Bureau of Air.

My academic credentials include a Bachelor of Ceramic Engineering Degree from Georgia Institute of Technology, Atlanta, Georgia, and a Master of Science Degree in Applied Earth Sciences from Stanford University, Stanford, California. I have been employed by Illinois EPA since April 1991 and have worked my entire career with the Illinois EPA in the capacity of writing and technically supporting regulations for the control of air pollution in Illinois.

My testimony today will address other regulatory programs and requirements that impact the proposed CAIR rule before the Board today. I will be discussing Governor Blagojevich's Sustainable Energy Plan, the Acid Rain program, the NO<sub>x</sub> SIP Call, the Clean Air Visibility Rule (CAVR) including BART, and a planned statewide NO<sub>x</sub> and SO<sub>2</sub> control strategy.

## Background

As Mr. Ross has presented in his overview of this proposed Illinois rule, U.S. EPA is requiring Illinois electric generating units (EGUs) to reduce  $NO_x$  and  $SO_2$  emissions consistent with the federal CAIR that was promulgated on May 12, 2005. Illinois EGUs are major contributors of these air pollutants, which are important precursors of  $PM_{2.5}$  (both  $NO_x$  and  $SO_2$ ) and ozone

(NO<sub>x</sub> only). The Illinois EPA has proposed a rule that will satisfy the federal CAIR requirements and, through the allocation methodology chosen, encourage impacted sources to utilize energy efficiency, renewable energy, and clean coal technology in Illinois so that the increasing demand for electricity in future years can be met without increasing air pollution.

In July 1997, U.S. EPA established the 8-hour ozone and  $PM_{2.5}$  National Ambient Air Quality Standards (NAAQS). Therefore, Illinois EPA not only must meet the federal CAIR requirements, but also must attain these NAAQS. As Mr. Kaleel has presented in his testimony, modeling on both a regional scale and at the state level indicates that substantial reductions of NO<sub>x</sub> and SO<sub>2</sub> will be necessary to attain the NAAQS in Illinois' two designated nonattainment areas of Chicago and Metro East St. Louis. The reductions of NO<sub>x</sub> and SO<sub>2</sub> resulting from the proposed rule will assist Illinois in reaching attainment in these two-nonattainment areas and in minimizing transport of air pollution to downwind states, but other control strategies and regulations will also be necessary before Illinois will be in compliance with the NAAQS.

The potential reductions, co-benefits, and impacts that other regulations will have on the Illinois proposed CAIR are discussed in the following paragraphs.

## Governor Blagojevich's Sustainable Energy Plan

The allocation methodology chosen by Illinois EPA in this proposed rule is designed to promote renewable energy and energy efficient technologies. This supports and complements Governor Blagojevich's Sustainable Energy Plan of February 2005 that has the same goals. The Governor's Sustainable Energy Plan, which was adopted by the Illinois Commerce Commission (ICC) in July 2005, includes both a Renewable Portfolio Standard (RPS) and an Energy Efficiency Portfolio Standard (EPS).

Under the Renewable Portfolio Standard in the Governor's plan, beginning January 1, 2007, the State's largest electric utilities will be supplying 2% of the electrical output to their Illinois customers with electricity generated from renewable energy sources. Under the Governor's plan, the renewable energy quota increases 1% annually to 8% by 2013. This requirement will lead to more than 3,000 megawatts of power generated from renewable sources by 2013. At least 75%

of this renewable energy – or more than 2,000 megawatts – would be generated by wind power.

The Governor's plan also includes an Energy Efficiency Portfolio Standard that will lead to greater investment by electric utilities in programs that save energy. By 2007, electric utilities will meet 10% of growth in demand for electricity through energy efficiency, ramping up to 25% by 2015. Under the plan, utilities will help their customers install more efficient heating and cooling systems, lights, and equipment that will slow the growth in energy use and help lower energy bills for homes and businesses.

The proposed rule to implement CAIR will work in conjunction with the Governor's plan by allocating NO<sub>x</sub> allowances to sources that generate electricity using renewable energy, as well as for projects that demonstrate improved energy efficiency in generating electricity. These allowances can also be used for compliance or can be traded. (The Governor's August 2006 energy proposal to promote IGCC, a recognized clean coal technology, and the use of biofuels in Illinois are also projects that appear to be supported by the proposed CAIR, but Illinois EPA has not completed its review of the Governor's newest proposal and withholds any comments on this matter as of this writing.)

## Acid Rain Program

The Acid Rain Program was established under Title IV of the 1990 CAA Amendments. The program calls for major reductions of  $NO_x$  and  $SO_2$ , the pollutants that cause acid rain, from electric generating units. The program sets a permanent cap on the total amount of  $SO_2$  that may be emitted by electric power plants nationwide at about one-half of the amount emitted in 1980, and allows flexibility for individual power plants to select their own methods of compliance. The program also sets  $NO_x$  emission limitations (in lb/millionBtu) for certain EGUs

The Acid Rain Program featured  $SO_2$  emissions allowances, which could be traded, where one allowance was a limited authorization to emit one ton of  $SO_2$ . Allowances may be bought, sold, or banked by power plants, brokers, or anyone else interested in holding them. Existing EGUs were allocated allowances for each future compliance year and all participants of the program are obligated to surrender to U.S. EPA the number of allowances that correspond to their reported

actual annual  $SO_2$  emissions. Any remaining  $SO_2$  allowances may be sold or banked for use in future years.

For  $SO_2$  the federal CAIR is based on the Acid Rain Program administered by U.S. EPA. States do not have flexibility of how to allocate  $SO_2$  allowances. The proposed Illinois rule incorporates by reference the provisions of the federal model rule for the CAIR  $SO_2$  trading program.

The NO<sub>x</sub> component of the Acid Rain Program established a maximum emission rate for various types of coal-fired boilers. These limits reflected the use of low-NO<sub>x</sub> burner technology as available in the mid-1990s. Flexibility was introduced to this command and control measure through compliance options such as emissions averaging. This allows power plants to over-control at units where it is technically easier or more economical to control emissions, thereby achieving emissions reductions at a lower cost.

In order to comply with the NO<sub>x</sub> CAIR, the Illinois EPA is proposing to opt-in to U.S. EPA's CAIR annual and ozone season NOx trading programs. For the seasonal and annual NOx capand-trade programs, Illinois EPA will allocate NO<sub>x</sub> allowances equivalent to USEPA's Annual and Seasonal NO<sub>x</sub> allowance budgets as set forth in the proposal and affected sources will be required to have NO<sub>x</sub> allowances equivalent to their seasonal and annual emissions. In addition, affected Acid Rain sources will still be required for the NO<sub>x</sub> portion of the Acid Rain program to achieve an annual emission rate at or below mandated levels by the Acid Rain program.

## NO<sub>x</sub> SIP Call

In October 1998, the U.S. EPA determined that sources in 22 states (including Illinois) in the eastern U.S. and the District of Columbia (23 jurisdictions) emit  $NO_x$  in amounts that significantly contributed to nonattainment of the 1-hour ozone NAAQS in one or more downwind states, and issued a call for revisions to States' implementation plans. This action is commonly referred to as the "NO<sub>x</sub> SIP Call."

The  $NO_x$  SIP Call required each of the named upwind jurisdictions to submit revisions to U.S. EPA for their State Implementation Plans (SIPs) to reduce the contribution of sources in the

upwind states to ozone problems downwind. U.S. EPA then identified measures it determined to be highly cost-effective: (1) for EGUs serving generators greater than 25 MWe; (2) from industrial boilers and turbines greater than 250 mmBtu, referred to as non-EGUs; (3) from cement kilns; and (4) from large stationary internal combustion engines. U.S. EPA established emission budgets for each jurisdiction covering the source sectors therein based on certain emission rates for each sector. U.S. EPA also gave the states flexibility for the EGU and Non-EGU sectors when it established the NOx SIP call trading program for EGUS and Non-EGUs that it would administer for states that chose to participate. In particular, the NO<sub>x</sub> SIP Call capped emissions from all affected EGUs and Non-EGUs during the ozone season (May 1 through September 30).

To comply with NO<sub>x</sub> SIP Call requirements, Illinois adopted regulations to reduce NO<sub>x</sub> emissions from cement kilns, non-EGUs, and EGUs. These regulations can be found in Subparts T, U, and W of 35 Ill. Adm. Code 217, respectively. Subpart W, the NO<sub>x</sub> Trading Program for EGUs, was implemented in the 2004 ozone season. Illinois EPA will continue to operate the NO<sub>x</sub> SIP Call trading program until implementation of the CAIR begins in 2009. U.S. EPA and Illinois EPA will no longer operate the NO<sub>x</sub> SIP Call trading program after the 2008 ozone season, as the CAIR NO<sub>x</sub> ozone season trading program will replace the NO<sub>x</sub> SIP Call trading program for EGUs. Emissions of NO<sub>x</sub> and SO<sub>2</sub> from non-EGUs will be addressed in future proposed rulemakings.

## Illinois Statewide NOx and SO2 Control Strategy

Illinois EPA is currently working on a statewide  $NO_x$  and  $SO_2$  control strategy that will require that controls be operated year-round on those categories of sources where controls are highly cost effective. The non-EGU emission source categories under consideration include reciprocating internal combustion engines and turbines; industrial, commercial, and institutional boilers; process heaters; cement and lime kilns; glass melting furnaces; iron and steel furnaces; and aluminum melting furnaces. The  $NO_x$  and  $SO_2$  emission reductions from this control strategy will further assist Illinois EPA's efforts in the attainment of the 8-hour ozone and  $PM_{2.5}$ NAAQS and satisfy the State's requirements under the  $NO_x$  SIP Call.

#### Clean Air Visibility Rule (CAVR)

Section 169A of the Clean Air Act sets a national goal for visibility, i.e., "the prevention of any future, and the remedying of any existing, impairment of visibility in Class I areas which impairment results from manmade air pollution". Class I areas include national parks and wilderness areas across the country.

In July 1997, U.S. EPA proposed amendments to the existing 1980 regulations to establish a program to address regional haze visibility impairment. On July 1, 1999, U.S. EPA finalized regional haze regulations to improve visibility in 156 federal Class I areas.

One of the requirements of the final regional haze regulation, which is now referred to as the Clean Air Visibility Rule(CAVR), is the application of best available retrofit technology (BART) to sources contributing to regional haze. BART requirements apply to facilities built between 1962 and 1977 that have the potential to emit more than 250 tons a year of visibility-impairing pollutants. The pollutants that cause visibility impairment include PM<sub>2.5</sub>, and compounds that contribute to PM<sub>2.5</sub> formation, such as NO<sub>x</sub>, SO<sub>2</sub> and, under certain conditions, volatile organic compounds and ammonia. Affected facilities are those that fall into 26 categories, including power plants and industrial boilers, and large industrial plants such as pulp mills, refineries, and smelters. Many of such facilities have previously not been subject to federal pollution control requirements for visibility impairing pollutants.

As noted in Mr. Rob Kaleel's testimony, U.S. EPA's modeling has demonstrated that existing control programs, including CAIR and CAVR, will improve visibility, but will not be enough to meet regional haze goals in the northern Class I areas. Based on this modeling, the Illinois EPA has decided not to assume that CAIR is equivalent to BART.

This concludes my written testimony. I will be available for questions regarding my testimony during the panel discussions.

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CODE 225, CONTROL OF EMISSIONS
FROM LARGE COMBUSTION SOURCES,
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R06-26 (Rulemaking- Air)

## **TESTIMONY OF DAVID E. BLOOMBERG**

Good afternoon. My name is David E. Bloomberg. I am employed by the Illinois Environmental Protection Agency as the Compliance Unit Manager in the Compliance and Enforcement Section within the Division of Air Pollution Control. I have been at the Agency in this capacity for over two years and four months, and was previously an Environmental Protection Engineer in the Air Quality Planning Section for twelve and a half years. My academic credentials include a Bachelor of Science degree in ceramic engineering from the University of Illinois at Champaign-Urbana.

Among my other duties, I supervise Illinois' portion of the current NOx trading program run under the NOx SIP Call. This has involved determining or approving the determination of which sources are eligible to receive certain types of allowances, such as early reduction credits and new source set-asides; determining or approving the determination of apportionment of allowances given to such sources or to other sources eligible to receive allowances; collecting or overseeing the collection of monies for sales of certain NOx allowances; informing U.S. EPA how to distribute NOx allowances to Illinois sources; answering questions concerning the Illinois

NOx rules; and related tasks.

In addition, as manager of the Compliance Unit, I approve Agency reviews of emissions and monitor testing conducted for sources subject to NOx regulations, participate in decisions regarding enforcement of the Board's air pollution regulations, and oversee the process of sending out Violation Notices and related activities.

I am here today to provide testimony and to answer questions that might arise regarding the compliance, monitoring, recordkeeping, and reporting aspects of the NOx portion of this rulemaking.

The proposed Sections 225.410 and 225.510 contain the compliance requirements for the CAIR NOx annual and ozone season trading program, respectively. Among these requirements is that each designated representative must hold CAIR NOx allowances for each of their subject units in an amount of at least one allowance per ton of NOx emitted from that unit during the control period, rounded to the nearest whole ton. This requirement is the same as in the existing seasonal NOx trading program.

Other requirements include that the source conduct the proper emissions monitoring, recordkeeping, and reporting. The monitoring, recordkeeping, and reporting requirements incorporate those of the federal CAIR program in 40 CFR 96, subpart HH. That subpart includes requirements for CAIR NOx sources to install and certify continuous emissions monitors; directions on how sources should handle monitoring systems that fail to meet quality-assurance,

quality-control, or data validation requirements; and provisions on recordkeeping and reporting of emissions and other related data. Other recordkeeping and reporting requirements also incorporate those of the federal CAIR program.

One type of monitoring in addition to the federal CAIR program is the monitoring of gross electrical output and useful thermal energy, found in Sections 225.450 and 225.550 of the proposed Illinois rule. Under the proposed rule, which uses gross electrical output and useful thermal energy as the means by which allowances are calculated and allocated – which are being discussed in more detail by Rory Davis and Jackie Sims – sources must measure and record the gross electrical output in megawatt-hours on a continuous basis. Cogeneration units must also monitor and record indicators of useful thermal energy that is produced on a continuous basis. Under the proposed regulation, this information must be submitted to the Agency on a quarterly basis. As noted in the TSD, electric generating units are currently required to report gross electrical output data to U.S. EPA.

There may be additional monitoring, recordkeeping, or reporting required for any project sponsor of a Clean Air Set-Aside request. However, those requirements will be specific to the project in question and thus are not described in detail within the proposed regulations. Examples of such possible additional requirements could include monitoring of air pollution control equipment upgrades as described in Sections 225.460(c) and 225.560(c), or documentation of new residential construction projects that qualify for Energy Efficient Tax Incentives as described in Sections 225.460(a)(2) and 225.560(a)(2). Information necessary to support requests under the Clean Air Set-Aside can be found in proposed Sections 225.470 and 225.570 of the proposed

rule. Clean Air Set-Asides are being discussed in more detail by Ross Cooper.

In summary, the monitoring, recordkeeping, and reporting requirements of this proposed rulemaking incorporate the requirements of the federal CAIR program. In addition, there are several further requirements that reflect the Illinois-specific aspects of this regulation, such as Clean Air Set-Asides and allocations based on gross electrical output.

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R06-26 (Rulemaking- Air)

## **TESTIMONY OF ROSTON COOPER**

## Qualifications

My name is Roston (Ross) Cooper. I am here today for the Illinois Environmental Protection Agency (Illinois EPA or Agency). I have a Bachelor of Science degree in electrical engineering from Northern Illinois University, and a Masters of Business Administration degree from the University of Illinois at Springfield. I have also completed the required training course and examination, successfully passed, toward being a Certified Energy Manager registered with the Association of Energy Engineers.

I joined the Agency in August 2001, as an Environmental Protection Engineer I in the State/FESOP Permit Section for the Bureau of Air. I am currently an Environmental Protection Engineer III in the Title 5 unit of the Permit Section. In addition to my duties related to permitting, I have assisted in developing a number of regulatory programs for stationary sources, including the proposed Illinois CAIR rule.

The purpose of my testimony of is to provide additional explanation of the Clean Air Set-Asides

(CASA) provisions of the proposed rule.

## Clean Air Set-Asides Overview

The Illinois EPA CAIR proposal uses the flexibility of the CAIR NO<sub>x</sub> trading program to include the use of set-asides to further the priorities of the State. Consistent with the goals of the State's sustainable energy plan as well as a cleaner environment, the Illinois EPA crafted the CASA to be used as incentives for various energy efficiency and renewable energy projects, pollution control upgrades at existing power plants, the construction of new highly efficient or clean coal technology power plants, and those projects that commence before a certain date. The set-aside of CAIR NO<sub>x</sub> allowances is not a reduction of the overall NO<sub>x</sub> budget as it is not a retirement of allowances. Instead the CASA are intended to be allocated to eligible applicants who in turn are expected to trade those allowances to the utilities for their compliance needs.

CAIR NO<sub>x</sub> allowances will be allocated to sponsors of approved projects in proportion to the quantity of electrical generation that is produced by the project, the amount of electrical generation that can be displaced by the project, or the demonstrable amount of NO<sub>x</sub>, SO<sub>2</sub>, or particular matter emissions that can be abated by the project. Projects that reduce SO<sub>2</sub> and particulate matter emissions are also eligible for CASA credit under the NOx annual program because these pollutants also contribute to nonattainment in Illinois. Importantly, almost one half of the set-aside is intended for allocation exclusively to projects sponsored by the existing power plants and the power sector.

While NO<sub>x</sub> allowances from the CASA may be later sold by sponsors of energy efficiency and

renewable energy (EE/RE) projects, the environmental benefit of such a set-aside in a trading program is two-fold. First, the monetary value of CAIR NO<sub>x</sub> allowances is an economic incentive to businesses and individuals who may be interested in participating in energy efficiency projects, or investing in renewable energy projects in Illinois. Second, initially allocating allowances to EE/RE projects that conserve energy or cleanly produce electricity makes each NO<sub>x</sub> allowance from the set-aside effectively represent a greater amount of available electricity being produced from the same quantity of NO<sub>x</sub> being emitted to the atmosphere.

## **CASA Category Descriptions**

The CASA is divided up into three major categories: Energy Efficiency and Conservation Projects/Renewable Energy Projects, Clean Coal Technology Projects, and Air Pollution Control Equipment Upgrades at existing power plants. A small portion of the CASA is also dedicated to projects that are undertaken before a certain date and are considered to be Early Adopters.

Energy Efficiency and Conservation Projects include demand-side management projects, energy efficient new construction, supply-side energy efficiency projects, and highly efficient electrical generation. Renewable Energy Projects include zero emission generation units, (wind, hydro, and solar power) and landfill gas and biomass electrical generation units. The Clean Coal Technology category includes Integrated Gasification Combined Cycle (IGCC) generation, electric generation from Circulating Fluidized Bed (CFB) boilers, and other future technologies for electric generation from coal combustion that can achieve emissions comparable to those associated with IGCC or CFB boilers. The Air Pollution Control Equipment Upgrade category

includes specific pollution control equipment, i.e. SCR, SNCR, FGD, or fabric filters, installed at existing affected units that reduces PM, NO<sub>x</sub>, or SO<sub>2</sub> emissions.

A sponsor of an Energy Efficiency and Conservation project may reapply for allowances from the CASA for an approved project each year for eight control periods. A sponsor of an Air Pollution Control Equipment Upgrade project may reapply for allowances from the CASA for an approved project each year for 15 control periods. A sponsor of a project that qualifies as an Early Adopter may receive allowances from that portion of the CASA for ten control periods. Sponsors of projects that involve the generation of electricity may apply for allowances from the CASA based upon gross electrical output for as long as the units are in operation.

The Illinois EPA proposal also details the time frames in which project construction must commence in order to be eligible for CAIR NO<sub>x</sub> allowances from the CASA. Demand side management, energy efficient new construction, and supply side energy efficiency and conservation projects must have commenced construction on or after January 1, 2003, to be eligible for CASA allowances. Fluidized bed coal combustion projects, efficient generation projects, or renewable energy emission units must have commenced construction on or after January 1, 2001, to be eligible for CASA allowances. All other projects must have commenced construction on or after July 1, 2006, to be eligible for CASA allowances.

## **CASA Project Specifications**

The Energy Conservation Projects and Renewable Energy Generation portion of the CASA is equal to 12% of the total CAIR NO<sub>x</sub> budget, and when compared with the United States EPA

(USEPA) suggested range of 5-15%, it is an acceptable portion of a  $NO_x$  trading budget for energy efficiency and renewable energy set-aside.

The number of allowances allocated to highly efficient generation projects will be determined by the quantity of electricity generated and the emission rates of those generators. Consideration is given towards the useful thermal energy associated with combined heat and power (CHP) projects.

Renewable Energy Generation is electricity generated using energy from the sun water, and wind or from another renewable source. Eligible hydroelectric plants are restricted to new generators, that are not replacements of existing generators, that commence operation on or after January 1, 2006, and do not involve the significant expansion of an existing dam or the construction of a new dam. The conversion factor used to calculate the number of allowances allocated for generation of electricity by zero emission generating units is greater than the factor used in calculations for allowances in the other categories of CASA, and is intended to encourage further development and investment in zero emission electrical generation in Illinois.

Other sources of renewable energy are also available in Illinois for electric generation, these could include generation from the combustion of ethanol, biodiesel, landfill gas, or biomass. Eligible renewable energy units are restricted to those units that generate electricity using more than 50 percent of the heat input on an annual basis from the renewable fuel. Renewable energy projects specifically do not include those projects who derive their energy from incineration by burning or heating of waste wood, tires, garbage, general household, institutional lunchroom or

office waste, landscape waste, or construction or demolition debris. Qualified sponsors of projects using renewable energy sources for electrical generation will receive CAIR  $NO_x$  allowances proportional to the unit's electrical generation for the life of the project. The conversion factor used to calculate the number of allowances allocated for generation of electricity by a renewable energy unit that produces some emissions will use a conversion factor that is significantly less than the factor used to calculate allocations for the other categories of CASA. This reflects a desire to promote electricity generated from renewable energy sources and the consideration that these renewable energy sources may produce appreciable amounts of  $NO_x$  when compared to zero emission generating units.

The Air Pollution Control Equipment Upgrade category of the CASA is intended for allocation to existing coal-fired units that voluntarily (i.e., not required by a court order, consent decree or a Supplemental Environmental Project (SEP)) have new pollution control devices installed beginning July 1, 2006. This category is equal to 5% of the total CAIR NO<sub>x</sub> budget. Projects that qualify for allowances from this portion of the CASA will receive allowances proportionate to the difference in the average emission rate of a unit before the installation of pollution control equipment and the average emission rate after installation of specific pollution control equipment for a period of up to 15 years. For air pollution control equipment upgrades that are not NO<sub>x</sub> specific, such as baghouses or FGD, the CAIR NO<sub>x</sub> allowances are available only for the annual trading program. In the seasonal trading program, allocations made for air pollution control equipment upgrades will be allocated for NO<sub>x</sub> specific controls only.

Allowances allocated from this portion of the CASA are intended to encourage utilities to install

pollution control equipment, and more specifically to install the equipment earlier than may have been required by CAIR.

The structure of the CASA is such that an undersubscribed category will be allowed to accumulate up to double its value, with the excess then used to supplement other categories as necessary. The proposed rule's intention is to make the installation of pollution control equipment in Illinois more cost effective.

The air pollution control equipment upgrade projects that qualify for this category of the CASA include selective non-catalytic reduction (SNCR), selective catalytic reductions (SCR), baghouses (or fabric filters), and flue gas desulfurization (FGD). Both SCR and SNCR have been shown to be cost-effective in reducing NO<sub>x</sub> emissions from utility boilers. This proposal includes baghouses and FGD in the Air Pollution Control Equipment Upgrade category of the CASA for the NO<sub>x</sub> annual trading program because they are effective methods for the reduction of  $PM_{2.5}$  and SO<sub>2</sub> emissions from power plants.

The Clean Coal Technology category allowances will be allocated to Integrated Gasified Combined Cycle (IGCC) generators and Circulating Fluidized Bed (CFB) combustion boilers, and any other future technologies that achieve comparable emission rates while generating electricity from coal combustion. This category of the CASA is equal to 6% of the total CAIR NO<sub>x</sub> budget. Projects that qualify for allowances from this category receive allowances based upon the difference in the emission rate of the clean coal technology and an emission rate of 1.0 lb. of NO<sub>x</sub> per MWh of electricity generated for the life of the project. Illinois currently has one

operational CFB boiler that is generating electricity, and is currently reviewing permit applications for the construction of a number of IGCC projects.

The timing-based Early Adopters portion of the CASA is equal to 2% of the total CAIR  $NO_x$  budget. Projects that qualify for allowances from this portion of the CASA must have commenced construction before December 31, 2012, and will receive allowances up to one plus one tenth of the number of allowances received from other categories of the CASA for a period of up to ten years.

## Economic Impacts

In addition to the CASA provisions of the proposed Illinois rule encouraging and promoting energy efficiency, renewable energy, conservation, and clean coal technology, use of these setasides should also create a number of secondary economic benefits. In 1999, U.S. EPA estimated the economic benefits that can accrue from a 5% energy efficiency and renewable energy set-aside in the NO<sub>x</sub> Budget Trading Program across the SIP Call region, including an estimated reduction in electric demand of over 90 billion kWh in 2003 in the NO<sub>x</sub> SIP Call region, approximately \$5 billion in energy bill savings to consumers in 2003, about \$150 million in compliance cost savings for 2003, and about 20,000 new jobs throughout the region.

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R06-26 (Rulemaking- Air)

## **TESTIMONY OF RORY DAVIS**

My name is Rory Davis. I am an Environmental Protection Engineer in the Air Quality Planning Unit, Air Pollution Control Section of the Illinois EPA's Bureau of Air. I have been employed by the Agency in the Air Quality Planning Unit for one year. Prior to that, I worked at the Illinois Department of Transportation for four years as an Engineering Technician. I have a Bachelor of Science degree in Computational Physics as well as a Bachelor of Science degree in Mathematics from Illinois State University. I also have a Masters degree in Engineering from the University of Illinois at Chicago. My graduate studies consisted of an interdisciplinary program involving coursework from the Chemical Engineering and Mechanical Engineering fields with a concentration on Environmental Engineering.

In my current position with the Agency my duties include providing technical support for regulatory proposals. I will be providing testimony regarding the output-based allocation methodology that the Agency has included in its CAIR proposal.

## **Output-based Allocation Methodology**

In an emissions trading program such as CAIR, an allocation methodology is a system for

determining the number of emission allowances that each emission unit will receive. In regulating electrical generating units an output-based allocation methodology is one based upon the electrical output attributed to a given unit. Illinois EPA has proposed an output-based allocation methodology for CAIR because it encourages greater efficiency from sources by allocating based on output rather than use of fuel, adds a degree of flexibility in compliance strategies for sources, as is true for most trading programs, and is consistent with the allocation methodology used for the Clean Air Set-Aside. The proposed output-based allocation is based on fuel type, and then the number of CAIR NOx allowances is adjusted proportional to a unit's fraction of the total calculated gross electrical output of all Illinois CAIR units for that period to determine a unit's final allocation.

Many of the categories of the CASA eligible for allowances for environmentally beneficial practices do not include a measure of heat input, and measuring heat input for other eligible categories would be inconsistent with the goals of the CASA . These include zero emission electrical generation, energy efficiency projects, clean coal technology projects, and pollution control technology upgrades. Further, it would not promote the goals of the CASA to allocate a greater number of CASA allowances for a greater measure of heat input. In addition, employing an output-based allocation methodology creates a level playing field where the production or conservation of electricity by the specified means in the CASA is encouraged in the same manner that allowances are allocated to affected CAIR sources.

#### **Gross Electrical Generation**

Illinois EPA has proposed to determine allocations based on gross electrical output rather than net output. Net output or net generation is a measure of electrical generation from a source

that is produced and available for sale or use. This excludes power used by the plant itself and other various losses in transformers before the electricity "leaves the plant." Gross electrical output is a measure of the electricity produced by a generator before any of these losses occur. The proposal is based on gross electrical output because gross output is simpler to measure. In a net generation measurement it is often unclear what a source is allowed to measure as net generation due to various configurations and interpretations of net generation. A gross output methodology makes use of measurements of how much electricity is produced by a generator. Second, gross output is measured before losses in the plant take place. This encourages efficiency in the generation process. Finally, gross electrical output is a measure that is currently reported by sources to the USEPA Clean Air Markets Division (CAMD), and is readily available for the calculation of allocations.

#### **Gross Electrical Output Metering**

As mentioned above, because CAIR sources are already reporting gross electrical output data to CAMD via the U.S. Department of Energy's Energy Information Administration (EIA), the equipment required for metering gross electrical output should already be in use at all affected CAIR sources. Illinois EPA has been in contact with the USEPA and the EIA regarding the quality control of gross output data. Illinois EPA is aware that other states subject to CAIR have also be in contact with USEPA.

The model CAIR does provide the states flexibility in allocation methodology, using an output-based allocation methodology is was one of the suggested options. A number of states currently use output-based regulations in regulating electric generating units including California, Connecticut, Massachusetts, New Hampshire, New Jersey, New York, and Ohio.

Other states are considering or expecting to use output-based regulations in their CAIR and CAMR implementation plans.

## **Flexibility in Illinois Proposal**

Illinois EPA's proposal has included a transition to an output-based regulation for electric generating units in Illinois by allowing an owner/operator of an electric generating unit to report heat input rather than gross electrical output for the first round of CAIR NOx allocations. This is further discussed in Jacquelyn Sims' testimony.

## Fuel Weighting in Allocation Methodology

Illinois EPA is proposing that a system of fuel weighting be used, as proposed in the model CAIR. In calculating the gross electrical output for a unit the type of fuel that is used for electrical production is also factored in. To calculate a unit's converted gross output, the total gross electrical output of a unit must be multiplied by 1.0 for units burning coal, by 0.6 for units burning oil, and by 0.4 for units burning natural gas. This accounts for the different emission rates of the various fuels for comparable heat values.

## **BEFORE THE ILLINOIS POLLUTION CONTROL BOARD**

IN THE MATTER OF:	)
	)
PROPOSED NEW CAIR SO <sub>2</sub> , CAIR NO <sub>X</sub>	)
ANNUAL AND CAIR NO <sub>X</sub> OZONE SEASON	)
TRADING PROGRAMS, 35 ILL. ADM.	)
CODE 225, CONTROL OF EMISSIONS	)
FROM LARGE COMBUSTION SOURCES,	)
SUBPARTS A, C, D and E	)

R06-26 (Rulemaking- Air)

## **TESTIMONY OF ROBERT KALEEL**

My name is Robert Kaleel. I am the Manager of the Air Quality Planning Section, Division of Air Pollution Control, Bureau of Air at the Illinois Environmental Protection Agency ("Illinois EPA"), Springfield, Illinois. I have a Bachelor of Science degree in meteorology from Northern Illinois University. I have worked at the Illinois EPA for more than twenty-five years, and have been in my present position since March 2004. Prior to that, I was the Manager of the Air Quality Modeling Unit in the Air Quality Planning Section, a position that I held for more than fifteen years. I have also worked as a private consultant as a specialist in air quality modeling. As Manager of the Air Quality Planning Section, my responsibilities include oversight of staff that provides technical support for regulatory initiatives needed to address air quality issues in Illinois, including the regulatory proposal before the Board at this hearing. I have also been closely involved with the development of Illinois' State Implementation Plans to address the PM<sub>2.5</sub> and ozone nonattainment areas in Illinois.

The purpose of my testimony is to summarize the air quality benefits expected from implementation of this proposal, as well as the corresponding health and welfare benefits resulting from improved air quality. My testimony is based on the information provided to the Board by the Illinois EPA in the "Technical Support Document" ("TSD") which accompanied the regulatory proposal.

In Illinois, electric generating units ("EGUs") are the largest sources of sulfur dioxide ("SO<sub>2</sub>") emissions to the atmosphere, and one of the largest sources of nitrogen oxides ("NO<sub>x</sub>"). These

pollutants are precursors to fine particulate matter, or  $PM_{2.5}$ , and  $NO_x$  is also a precursor to ozone. According to the United States Environmental Protection Agency ("U.S. EPA"), the power sector accounted for 67% of total nationwide  $SO_2$  emissions and 22% of total nationwide  $NO_x$  emissions in 2003. Control of the emissions of these air pollutants from electric generating units is necessary for the State of Illinois to comply with the July 1997 revised National Ambient Air Quality Standards ("NAAQS") for 8-hour ozone and for  $PM_{2.5}$ .

Section 110 of the Clean Air Act ("CAA"), as amended in 1990, mandates that the State of Illinois adopt a State Implementation Plan ("SIP") with adequate provisions to assure attainment of the primary and secondary NAAQS not only within its state boundaries. Section 110 also prohibits any stationary sources in one state from emitting air pollutants that prevent any other state from attaining the NAAQS. The U.S. EPA published a Notice of Proposed Rulemaking on January 30, 2004, a Supplemental Proposal on June 10, 2004, and a final CAIR Rulemaking on May 12, 2005. In these proposed and final rulemakings, U.S. EPA published findings based on air quality modeling and ambient air quality data analyses that 28 states and the District of Columbia "contribute significantly" to nonattainment of either or both of the PM<sub>2.5</sub> or 8-hour ozone NAAQS in downwind areas. Based on these findings, the final CAIR rule requires these upwind states to revise their SIPs to either include control measures or to opt into the regional emission trading program, which establishes emissions cap-and-trade program for participating sources to reduce emissions of SO<sub>2</sub> and/or NO<sub>x</sub> to facilitate downwind states in attaining the PM<sub>2.5</sub> and/or 8-hour ozone NAAQS. Illinois is one of the 28 states that must revise its SIP as a result of CAIR and U.S. EPA's findings.

Two metropolitan areas in Illinois have been designated by U.S. EPA as nonattainment areas for  $PM_{2.5}$ : the Chicago area, which includes Cook, DuPage, Kane, Lake, McHenry, Will counties and portions of Kendall and Grundy counties; and the Metro-East St. Louis area, which consists of Madison, Monroe, and St. Clair counties and a portion of Randolph County. I have attached to my testimony Figure 2-1 from the TSD showing the  $PM_{2.5}$  nonattainment areas for the all the states in U.S. EPA Region 5. These areas were designated nonattainment by U.S. EPA on January 5, 2005.

For 8-hour ozone, the geographic areas designated as nonattainment by U.S. EPA are approximately the same areas that were designated as nonattainment for  $PM_{2.5.}$  The only difference in the geographic extent of the nonattainment areas for the two pollutants is in the Metro-East St. Louis area, where the 8-hour ozone nonattainment area includes Jersey County and does not include Randolph Township in Randolph County. Figure 2-2 in the TSD shows the 8-hour ozone nonattainment areas for the states in Region 5. This figure is attached to my testimony. These areas were designated nonattainment by U.S. EPA on April 30, 2004.

Fine particles and ozone are associated with thousands of premature deaths and illnesses each year in the United States. In revising the NAAQS for particulate matter to establish the ambient standards for PM<sub>2.5</sub> in July 1997, U.S. EPA found that fine particles aggravate respiratory, lung, and cardiovascular diseases, decrease lung function, and increase asthma attacks, heart attacks, and cardiac arrhythmia. As a consequence of over-exposure in breathing fine particles, hospital admissions and emergency room visits increase as does absenteeism from school and work. Older adults, people with heart and lung disease, and children are the segments of society that are particularly sensitive to fine particle exposure. Attainment of the PM<sub>2.5</sub> standard will prolong thousands of lives in the State of Illinois and in downwind states. Additional information on the health effects of fine particles can be found on U.S. EPA's website at: (http://www.epa.gov/ttn/naaqs/standards/pm/s\_pm\_index.html).

U.S. EPA also revised the NAAQS for ozone in July 1997, stating that "the new primary standard will provide increased protection to the public, especially children and other at-risk populations, against a wide range of ozone-induced health effects." In setting the new 8-hour ozone standard, U.S. EPA found that exposures to ozone of one to three hours in length has been found to irritate the respiratory system, causing coughing, throat irritation, and chest pain. Ozone exposure can limit lung function and breathing capacity resulting in rapid and shallow breathing thereby lowering or curtailing a person's normal activity level. As with PM<sub>2.5</sub> exposure, ozone exposure increases asthma attacks for people with respiratory disorders. Longer-term ozone exposure may result in damage to the lung tissue and lining from inflammation, which can produce permanent and irreversible changes in lung function. Children and adults who are active outdoors are particularly susceptible to ozone, as well as people with

asthma and respiratory diseases. Ozone also affects sensitive ecosystems and vegetation, resulting in reduced crop yields, reduced growth and lowered pest resistance, and a lowered ability for plants and trees to survive. Information on the health effects to humans and vegetation from exposure to ozone can be found on U.S. EPA's website at: (http://www.epa.gov/ttn/naaqs/standards/ozone/s\_o3\_index.html).

To the extent that this proposal will help to attain the NAAQS in Illinois and downwind states, the reduction of  $NO_x$  and  $SO_2$  emissions will provide significant monetary and non-monetary health and welfare benefits. U.S. EPA estimates that nationwide, CAIR will yield health benefits in 2015 of between \$86 and \$101 billion. These estimates include the value of avoiding approximately 17,000 premature deaths, 22,000 non-fatal heart attacks, 12,300 hospitalizations for respiratory and cardiovascular diseases, 1.7 million lost work days, 500,000 school absences, and 10.6 million days when adults restrict normal activities because of respiratory symptoms exacerbated by  $PM_{2.5}$  and ozone pollution. U.S. EPA also estimates substantial additional health improvements for children from reductions in upper and lower respiratory illnesses, acute bronchitis, and asthma attacks. Estimated annual reductions in incidences of health effects are shown in Table 3-1 of the TSD, which I have attached to my testimony. Estimated annual monetary value of reductions in incidences of health and welfare effects are presented in Table 3-2 of the TSD, which is also attached to my testimony.

In assisting the downwind nonattainment areas in achieving the PM<sub>2.5</sub> and 8-hour ozone NAAQS, CAIR will also provide the welfare benefits, including both environmental and other societal benefits, of reducing pollution. Welfare benefits include reductions in damage to ecosystems, improved visibility and improvements in recreational and commercial fishing, agricultural yields, and forest productivity. U.S. EPA estimated that CAIR will yield welfare benefits of \$1.8 billion in 2015 for visibility improvements in Class I areas and reduced regional haze in scenic areas, which are the goals of the federal Regional Haze Rule promulgated in 1999.

In estimating the net benefits of the regulation, the appropriate cost measure is social costs, which represent the costs (e.g., increases in the price of electricity to consumers) of the rule to society. The social costs of CAIR across all affected states are estimated to be between \$1.9 and

\$2.1 billion in 2010, and between \$2.6 and \$3.1 billion in 2015. The net effect is that CAIR would be highly beneficial to society, with annual net benefits (benefits less costs) of approximately \$60 to \$71 billion in 2010, and \$83 to \$98 billion in 2015.

U.S. EPA was unable to monetize important benefits beyond the human health and welfare benefits that are expected to occur from CAIR. These other benefits occur both directly from  $NO_x$  and  $SO_2$  emissions reductions, and from reductions in co-pollutants such as mercury. Additionally, reductions in  $NO_x$  and  $SO_2$  emissions required by CAIR will reduce acid deposition, in the case of  $NO_x$ , eutrophication of water bodies. Reduced nitrate contamination of drinking water is another possible benefit of the rule.

According to U.S. EPA, the proposed regulations to implement the CAIR program will provide substantial NOx and SO<sub>2</sub> emission reductions in Illinois, yielding significant air quality benefits. Table 9.1 in the TSD summarized the expected emission reductions in Illinois based on U.S. EPA's estimates. I have attached Table 9.1 to my testimony. Beginning in 2009, implementation of CAIR will reduce NOx emissions by 70,018 tons annually, relative to the projected 2009 base scenario. By 2015, CAIR will reduce NOx emissions by 97,776 tons annually, relative to the projected 2015 base scenario. CAIR will also reduce SO<sub>2</sub> emissions significantly in Illinois, by 192,670 tons per year, relative to Illinois' annual Title IV (Acid Rain) allocation, and by 250,472 tons annually by 2015.

To evaluate the air quality benefits of CAIR emission reductions, U.S. EPA performed extensive air quality modeling, as documented in its "Technical Support Document for the Final Clean Air Interstate Rule – Air Quality Modeling" (March 2005). The base year (2001) emissions inventory for electric generating units was based on 2001 Continuous Emissions Monitoring (CEM) data, while output from the Integrated Planning Model was used to develop future year emissions for 2010 and 2015 from electric generating units for the CAIR cap-and-trade programs. The Integrated Planning Model ("IPM") is an electricity capacity planning and dispatch model that simulates the operation of the electrical power system based on engineering and economic factors.

U.S. EPA's model results for ozone demonstrate that CAIR NO<sub>x</sub> emission controls provide few air quality benefits in 2010 beyond those provided by the NO<sub>x</sub> SIP Call. The Chicago area and other nonattainment areas around Lake Michigan will continue to exceed the 8-hour ozone standard in 2010. In fact, U.S. EPA's modeling shows that the Chicago area will not attain the 8-hour ozone standard even with full implementation of CAIR in 2015, and significant additional emission reductions will be necessary. States shown by U.S. EPA to contribute significantly to nonattainment in Chicago are Illinois, Indiana, Missouri, and Iowa. U.S. EPA's modeling also shows that Illinois has a significant impact on other nonattainment counties in states downwind: Geauga County, Ohio; Macomb County, Michigan; and Ozaukee and Sheboygan Counties, Wisconsin.

For  $PM_{2.5}$ , U.S. EPA's modeling shows that CAIR SO<sub>2</sub> and NO<sub>x</sub> emission reductions provide some air quality benefits in 2010. For Illinois, however, the modeling shows that implementation of CAIR will not provide sufficient emission reductions for the St. Louis and Chicago areas to attain the  $PM_{2.5}$  annual standard, even by 2015. Clearly, Illinois and other states will need to pursue additional emission reductions beyond CAIR to achieve compliance with the NAAQS. Significant contributors to the Metro-East St. Louis and the Chicago nonattainment counties (based on the 2010 simulation) are given in Table 3-3, which is attached to my testimony. Illinois has also been shown to contribute significantly to  $PM_{2.5}$  nonattainment in 2010 in a number of counties downwind of Illinois. These counties and associated contributions from Illinois are listed in Table 3-4, which is also attached.

The Lake Michigan Air Directors Consortium ("LADCO") has confirmed U.S. EPA's modeling analysis of the air quality benefits of CAIR. LADCO used the CAMx model, the same model used by U.S. EPA, and an updated emissions inventory for their analysis of CAIR. The LADCO base emissions for electric generating units are derived from U.S. EPA's Consolidated Emissions Reporting Rule ("CERR") inventory for 2002. Output from the IPM was used to develop projected 2009 emissions for electric generating units. A cap-and-trade program for all states subject to CAIR is assumed, with no restrictions on trading.

Similar to U.S. EPA's findings, the LADCO modeling shows that "existing control programs

including CAIR... will not be enough to provide for attainment." (Attainment Strategy Options, DRAFT, 10/28/05). Nonattainment is shown in the Chicago area for 8-hour ozone and  $PM_{2.5}$ , and in the Metro-East St. Louis area for  $PM_{2.5}$ , even with full implementation of CAIR by 2015. In regard to regional haze, "the modeling also shows that existing control programs, including CAIR and BART, will improve visibility, but will not be enough to meet regional haze goals in the northern Class I areas."

LADCO performed additional modeling to estimate the amounts of additional emission reductions beyond CAIR that are necessary to show attainment for PM<sub>2.5</sub> and ozone in Illinois and other nonattainment areas in the Midwest. LADCO evaluated the effectiveness of varying levels of precursor emission reductions assumed locally (i.e., within the nonattainment areas) and regionally (within the five-state LADCO region, which includes Illinois, Indiana, Ohio, Michigan, and Wisconsin). The full results are contained in Table 3-5 of the TSD. A copy of that table is attached to my testimony.

LADCO's results indicate that for ozone, VOC emission reductions in excess of 75% within the Chicago NAA may be needed to achieve the ozone NAAQS, assuming no additional, regional reductions of NO<sub>x</sub> are implemented. Similarly, regional NO<sub>x</sub> reductions of about 40% beyond CAIR are needed, unless local VOC reductions are assumed. Reduction targets of 35% local VOC, and 35% regional NO<sub>x</sub> (beyond CAIR) have also been shown to achieve the 8-hour ozone standard in LADCO's analysis.

For  $PM_{2.5}$ , local emission reductions of organic carbon of at least 40% are needed to attain the NAAQS, if no regional emission reductions beyond CAIR are assumed. The local VOC organic carbon reduction target is 25% - 30%, if regional NO<sub>x</sub> and SO<sub>2</sub> reductions of 25% - 30% beyond CAIR are assumed. Without local emission reductions, regional reductions of SO<sub>2</sub> and NO<sub>x</sub> of at least 50% beyond CAIR must be assumed to demonstrate attainment. Thus, LADCO's modeling shows that, for ozone and PM<sub>2.5</sub>, regional SO<sub>2</sub> and NO<sub>x</sub> emission reductions greater than those provided by CAIR, in combination with further emission reductions within the nonattainment areas, must be achieved before nonattainment areas in Illinois can attain the NAAQS.

As noted in the testimony of Jim Ross, the Illinois EPA's proposal uses the flexibility provided by CAIR. Notable areas where Illinois has utilized this flexibility includes allowance allocations based on an electrical output basis, rather than a heat input basis, retirement of the NOx compliance supplement pool, a set-aside of 5% of the allowances for new units in both phases of CAIR, a set-aside of 25% of the allowance budget, both seasonally and annually, to encourage and promote energy efficiency, renewable energy, conservation, and clean coal technology. The Illinois EPA retained ICF Consulting to evaluate the expected change in NOx emissions in Illinois resulting from this proposal. As described in the TSD, ICF used the IPM model to compute projected changes in emissions, as well as electric generation, and costs. ICF conservatively assumed that 30% of Illinois' CAIR allowances would be retired. In fact, Illinois EPA's proposal retires only the compliance supplement pool, which represents only about 15% of the annual allocation for one control period. ICF's modeling shows that NOx emissions from electric generating units in Illinois will not change significantly, relative to CAIR, even if a full 30% of the allowance allocation is retired. Since NOx emissions are not expected to change relative to CAIR, Illinois EPA does not expect that the air quality impacts from existing electric generating units will be significantly different under this proposal versus CAIR. Thus, the air quality modeling of the federal CAIR rule performed by U.S. EPA and LADCO, as described above, are representative of the air quality benefits of this proposal.

It should be noted that LADCO's modeling results are not final, and that the Illinois EPA in cooperation with the States of Wisconsin, Michigan, Indiana, and Ohio, are continuing to develop and refine the modeling system. Thus, the results cited above may change as further refinements of the modeling are developed. Even though the emission reduction targets listed in Table 3-5 may be revised in the final attainment demonstration, it is unlikely that the region will attain the 8-hour ozone and  $PM_{2.5}$  NAAQS without greater emission reductions from electric generating units than are provided by CAIR.

Figure 2-1: PM<sub>2.5</sub> Nonattainment Areas



## PM2.5 Designations

Attainment Nonattainment Nonattainment (part county)

**Figure 2-2: 8-Hour Ozone Designations** 



## 8-Hour Ozone Designations

Attainment

Nonattainment

Nonattainment (part county)

	2010 Annual	2015 Annual		
Health Effects	Incidence	Incidence		
	Reduction	Reduction		
PM – Related End	points			
Premature Mortality				
Adult, age 30 and over	13,000	17,000		
Infant, age < 1 year	29	36		
Chronic Bronchitis (adult, age 26 and over)	6,900	8,700		
Non-fatal myocardial infarction (adult, age				
18 and over)	17,000	22,000		
Hospital Admissions – Respiratory (All				
ages)	4,300	5,500		
Hospital Admissions – Cardiovascular				
(adults, age > 18)	3,800	5,000		
Emergency Room Visits for Asthma (age				
18 years and younger)	10,000	13,000		
Acute Bronchitis, (children, age 8-12)	16,000	19,000		
Lower Respiratory Symptoms (children,				
age 7-14)	190,000	230,000		
Upper Respiratory Symptoms (Asthmatic				
Children, age 9-18)	150,000	180,000		
Asthma Exacerbation (asthmatic children,				
age 6-18)	240,000	290,000		
Work Loss Days	1,400,000	1,700,000		
Minor Restricted Activity Days (adults age				
18-65)	8,100,000	9,900,000		
Ozone – Related Endpoints				
Hospital Admissions – Respiratory Causes				
(adult, 65 and older)	610	1,700		
Hospital Admissions – Respiratory Causes				
(children, under 2)	380	1,100		
Emergency Room Visit for Asthma (all				
ages)	100	280		
Minor Restricted Activity Days (adults, age				
18-65)	280,000	690,000		
School Absence Days	180,000	510,000		

 Table 3-1

 Estimated Annual Reductions in Incidence of Health Effects in U.S.<sup>3</sup>

in Incidence of Health and Welfare Effects in the U.S. <sup>3</sup> (Millions of 1999\$)					
		2010 Estimated	2015 Estimated		
Health Effect	Pollutant	Value of	Value of		
		Reductions	Reductions		
Premature mortality					
Adult $> 30$ years					
3% discount rate	PM <sub>2.5</sub>	\$67,300	\$92,800		
7% discount rate	PM <sub>2.5</sub>	56,600	78,100		
Child < 1 year	PM <sub>2.5</sub>	168	222		
Chronic Bronchitis (adults 26 and					
over)	PM <sub>2.5</sub>	2,520	3,340		
Non-fatal Acute Myocardial					
Infarctions	PM <sub>2.5</sub>	1,420	1,850		
3% discount rate	PM <sub>2.5</sub>	1,420	1,850		
7% discount rate	PM <sub>2.5</sub>	1,370	1,790		
Hospital Admissions for					
Respiratory Causes	PM <sub>2.5</sub> , O3	45.2	78.9		
Hospital Admissions for					
Cardiovascular Causes	PM <sub>2.5</sub>	80.7	105		
Emergency Room Visits for					
Asthma	PM <sub>2.5</sub> , O3	2.84	3.56		
Acute Bronchitis (Children, age 8-					
12)	PM <sub>2.5</sub>	5.63	7.06		
Lower Respiratory Symptoms					
(children, age 7-14)	PM <sub>2.5</sub>	2.98	3.74		
Upper Respiratory Symptoms					
(asthma, age 9-11)	PM <sub>2.5</sub>	3.80	4.77		
Asthma Exacerbations	PM <sub>2.5</sub>	10.3	12.7		
Work Loss Days	PM <sub>2.5</sub>	180	219		
Minor Restricted Activity Days					
(MRADs)	PM <sub>2.5</sub> , O3	422	543		
School Absence Days	O3	12.9	36.4		
Worker Productivity (outdoor					
workers, age 18-65)					
	O3	7.66	19.9		
Recreational Visibility, 81 class I,					
areas	PM <sub>2.5</sub>	1,140	1,780		
Monetized Total					
Base estimate					
3 % discount rate	PM <sub>2.5</sub> , O3	\$73,300 + B	\$101,000 + B		
7 % discount rate	$PM_{2.5}, O3$	62,600 + B	\$86,300 + B		

Table 3-2Estimated Annual Monetary Values of ReductionsIn Incidence of Health and Welfare Effects in the U.S.<sup>3</sup> (Millions of 1999\$)

*B* represents the monetary value of health and welfare benefits not monetized.

## Table 3-3

# Upwind States' Contribution to PM<sub>2.5</sub> Nonattainment Counties in Illinois in 2010 Based on U.S. EPA's Modeling in Support of the CAIR Rulemaking

Nonattainment Area	Upwind State	<b>Contribution</b> (ug/m <sup>3</sup> )
Chicago	Illinois	1.04
Chicago	Indiana	0.66
Chicago	Iowa	0.28
Chicago	Michigan	0.40
Chicago	Minnesota	0.21
Chicago	Missouri	0.31
Chicago	Ohio	0.24
Chicago	Wisconsin	0.56
Metro-East	Illinois	0.83
Metro-East	Indiana	0.48
Metro-East	Iowa	0.28
Metro-East	Kentucky	0.21
Metro-East	Missouri	1.07
Metro-East	Ohio	0.21
Metro-East	Texas	0.29

Note: U.S. EPA's significance criteria is  $0.2 \text{ ug/m}^3$ .

## Table 3-4

# Illinois Contribution to Downwind PM<sub>2.5</sub> Nonattainment Counties in 2010 Based on U.S. EPA's Modeling in Support of the CAIR Rulemaking

<b>Downwind State</b>	County	<b>Contribution</b> (ug/m <sup>3</sup> )
AL	Jefferson	0.21
IL	Cook	1.04
IL	Madison	0.80
IL	St. Clair	0.83
IN	Clark	0.39
IN	Dubois	0.58
IN	Lake	1.02
IN	Marion	0.76
IN	Vanderburgh	0.76
KY	Fayette	0.32
KY	Jefferson	0.38
MI	Wayne	0.42
ОН	Butler	0.38
ОН	Cuyahoga	0.32
ОН	Franklin	0.40
ОН	Hamilton	0.38
ОН	Lawrence	0.21
ОН	Mahoning	0.25
ОН	Montgomery	0.44
ОН	Scioto	0.25
ОН	Stark	0.26
ОН	Summit	0.30
PA	Allegheny	0.21
TN	Hamilton	0.20
WV	Cabell	0.21
WV	Kanawha	0.20

Note: U.S. EPA's significance criteria is 0.2 ug/m<sup>3</sup>.

		Local VOC	<b>Regional NO<sub>x</sub></b>	<b>Regional SO<sub>2</sub></b>
		(or CO)		C
Chicago	(1) Ozone	> 75%		
	(2)		40%	
	(3)	35%	35%	
	(1) $PM_{2.5}$	30%	30%	
	(2)	25%	25%	25%
Milwaukee	(1) Ozone	75%		
	(2)		30%	
	(3)	25%	25%	
Granite City	(1) $PM_{2.5}$	25%	25%	
	(2)	20%	20%	20%
Detroit	(1) PM <sub>2.5</sub>	50%	50%	
	(2)	30%	30%	30%
Cleveland	(1) Ozone	75%		
	(2)		30%	
	(3)	25%	25%	
	(1) $PM_{2.5}$	25%	25%	
	(2)	20%	20%	20%

 Table 3-5

 Level of Control Needed to Achieve Attainment in Specific Nonattainment Areas

	Actual		<b>Base Title IV Allowances</b>		
$SO_2$	2002	2004	2010	2015	2020
Baseline Emissions (tons/yr)	353,700	362,900	385,341	385,341	385,341
CAIR Budget Caps (tons/yr)			192,671	134,869	134,869
Trading Allowances/Emissions Reductions Needed (tons/yr)			192,670	250,472	250,472
	Act	ual	<b>IPM Base Case</b>		
NO <sub>x</sub> Annual	2002	2004	2009/2010	2015	2020
Baseline Emissions (tons/yr)	174,247	141,315	146,248	159,452	161,301
CAIR Budget Caps (tons/yr)			76,230	63,525	63,525
Trading Allowances/Emissions Reductions Needed (tons/yr			70,018	95,927	97,776
	Actual		<b>IPM Base Case</b>		
NOx Ozone Season	2002	2004	2009/2010	2015	2020
Baseline Emissions (tons/season)	71,235	27,474	34,323	36,057	37,884
CAIR Budget Caps (tons/season)			30,701	28,981	28,981
Trading Allowances/Emissions Reductions Needed (tons/yr			3,622	7,076	8,903

Table 9-1Illinois Emissions Reductions Due to CAIR Budget Caps

## **BEFORE THE ILLINOIS POLLUTION CONTROL BOARD**

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IN THE MATTER OF:
PROPOSED NEW CAIR SO <sub>2</sub> , CAIR NO <sub>X</sub>
ANNUAL AND CAIR NO <sub>X</sub> OZONE SEASON
TRADING PROGRAMS, 35 ILL. ADM.
CODE 225, CONTROL OF EMISSIONS
FROM LARGE COMBUSTION SOURCES,
SUBPARTS A, C, D and E

R06-26 (Rulemaking- Air)

## **TESTIMONY OF YOGINDER MAHAJAN**

Good Morning. My name is Yoginder Mahajan. I am employed as an Environmental Protection Engineer in the Air Quality Planning Section in the Bureau of Air of the Illinois Environmental Protection Agency (Illinois EPA). I have been employed in this capacity since March 1992. Prior to my employment with Illinois EPA I worked for various metal fabrication industries for nine (9) years. My educational background includes a Bachelor of Engineering Degree in Mechanical Engineering from Bhopal University at Bhopal, India.

As part of my regular duties in the Air Quality Planning Section, I have been involved with preparing emission estimates for various source categories used in the development of the 1990 ozone season weekday emissions inventories; evaluating control technologies applicable to volatile organic material (VOM) emissions sources utilized in the preparation of the Rate-of-Progress plans for the Chicago and St. Louis ozone nonattainment areas; and assisting in the development of regulations for the control of VOM emissions from source categories included in the Rate-of-Progress plans. Regarding the proposal before you today, I have been involved in the development of the regulations to control nitrogen oxides (NOx) and sulfur dioxide (SO<sub>2</sub>) emissions from electric generating units (EGUs), and I provided the list of affected sources for

the proposal and technical feasibility of NOx and SO<sub>2</sub> controls for the Technical Support Document (TSD) for the proposal.

In the electric power plant sector, turbines are used to produce rotary motion for electric generators that produce electric power. Gas turbines burn fuel, typically natural gas or distillate oils, whereas steam from a boiler is used to run steam turbines. Emissions of NOx and  $SO_2$  are the result of combustion of coal, fuel oils, or natural gas in the boilers and combustion of natural gas or distillate oils in the gas turbines.

Today's proposal is to control NOx and SO<sub>2</sub> emissions from fossil-fuel-fired electric generating units that have nameplate capacities greater than 25 megawatt of electricity (MWe). As part of evaluation of the control of NOx and SO<sub>2</sub> from EGUs, Illinois EPA identified several sources of guidance. The United States Environmental Protection Agency (U.S. EPA) published two Alternative Control Techniques (ACT) documents - <u>NOx Emissions from Utility Boilers</u>, and <u>NOx Emissions from Stationary Gas Turbines</u>. Also, U.S. EPA published <u>Control Techniques</u> for Sulfur Dioxide Emissions from Stationary Sources. These documents contain detailed information on description of sources of NOx and SO<sub>2</sub> emissions, various techniques of controlling NOx and SO<sub>2</sub> and the costs of various controls. Illinois EPA used information contained in these documents for general background, but relied on the information contained in U.S. EPA's, <u>Regulatory Impact Analysis for the Final Clean Air Interstate Rule</u> for the costs and economics impacts of today's proposal.

Illinois EPA reviewed the 2004 Acid Rain emission database and identified that there are 229

existing Illinois electric generating units that may be affected by these proposed regulations. Of these 229 units, 59 are coal-fired boilers and the remaining 170 units are oil/gas-fired boilers or turbines. Out of the 59 coal-fired boilers, 34 are tangentially-fired, five are wall-fired, 19 are cyclone-fired boilers, and one is a fluidized-bed combustion boiler. In Illinois, in 2004, coal-fired electric generating units accounted for approximately 99 percent of NOx and SO<sub>2</sub> emissions from Illinois electric generating units.

One method of reducing NOx emissions is through the use of combustion controls such as low NOx burners and over-fired air. Combustion controls reduce NOx, by ensuring that the combustion of coal occurs under conditions which produce less NOx. Post-combustion controls reduce NOx by removing the NOx after it has been formed. The most common post-combustion control is selective catalyst reduction (SCR). SCR systems inject ammonia (NH<sub>3</sub>) which combines with the NOx in the flue gas to form nitrogen and water and uses a catalyst to enhance the reaction. These systems can reduce NOx emissions by 90 percent. Selective non-catalytic reduction also removes NOx by injecting ammonia without the use of a catalyst. These systems can reduce NOx emissions by 40 percent.

There are two primary options for reducing SO<sub>2</sub> emissions from coal-fired electric generating units. They may switch from higher to lower sulfur coal, or they may use flue gas desulfurization, commonly referred to as scrubbers. The most commonly used scrubber types include wet scrubbers and spray dryers. Wet scrubber can use a variety of sorbents to capture SO<sub>2</sub> including limestone and magnesium enhanced lime. New wet scrubbers typically achieve at least 95 percent SO<sub>2</sub> removal. Spray dryers can achieve over 90 percent SO<sub>2</sub> removal.

To allow for the use of the most cost effective emission reduction alternatives, Illinois EPA relied on the CAIR NOx and SO<sub>2</sub> Budget Trading Programs administered by the U.S. EPA. Each of the States subject to the CAIR is encouraged to participate in these trading programs and thereby provide a mechanism for sources to achieve cost effective NOx and SO<sub>2</sub> reductions. For NOx, the trading unit is a CAIR NOx Allowance, equal to one ton of emitted NOx. The CAIR SO<sub>2</sub> program provides that an SO<sub>2</sub> allowance allocated for a control period in a year before 2010 would be equivalent to one ton of sulfur dioxide emissions. An SO<sub>2</sub> CAIR allowance allocated during a control period 2010 through 2014 would be equivalent to .50 tons of sulfur dioxide. Finally, an SO<sub>2</sub> CAIR allowance allocated for a control period in 2015 and thereafter will be equivalent to .35 tons of sulfur dioxide emissions.

Under the CAIR trading programs, each source would be given a certain quantity of NOx and  $SO_2$  allowances. If a source's actual emissions exceed its allocated allowances, the source may purchase additional allowances. Conversely, if a source's actual emissions are below its allocated allowances, then it may sell the additional allowances. Banking would allow sources that do not use their allowances for a given year to save them for later use.

Illinois EPA has relied on the cost estimates analysis performed by U.S. EPA. For cost effectiveness of CAIR NOx and SO<sub>2</sub> reductions, U.S. EPA provided two types of costs in 1999 dollars per ton of NOx and SO<sub>2</sub> reductions. For NOx, the estimated average cost per ton of annual NOx reductions will be \$500 in 2009, and \$700 in 2015. The estimated marginal cost per ton of annual NOx will be \$1,300 in 2009, and \$1,600 in 2015. For SO<sub>2</sub>, the estimated average cost per ton of SO<sub>2</sub> reductions will be \$500 in 2010 and \$700 in 2015. The estimated marginal

cost per ton of  $SO_2$  will be \$700 in 2009, and \$1,000 in 2015. Illinois EPA believes that these costs estimates are also representative of costs incurred by the affected electric generating units of this proposal. However, since Illinois is already controlling electric generating units in the ozone season to comply with NOx SIP Call, Illinois electric generating units are not expected to incur any additional costs in the 2009 ozone season. However, in the non-ozone season months, it will cost \$500 per ton to run these controls to comply with the CAIR NOx trading program.

Based on the IPM-projected NOx emissions in 2009/2010 and 2015, respectively, the proposed regulations to control NOx and SO<sub>2</sub> emission from electric generating units will provide NOx emission reductions of 70,018 tons in 2009 and 97,776 tons in 2015. It will also provide SO<sub>2</sub> emissions reductions of 192,670 tons in 2010 and 250,472 tons in 2015 from the base Title IV allowances available for Illinois electric generating units.

## **BEFORE THE ILLINOIS POLLUTION CONTROL BOARD**

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N THE MATTER OF:	
PROPOSED NEW CAIR SO <sub>2</sub> , CAIR NO <sub>X</sub>	
ANNUAL AND CAIR NO <sub>X</sub> OZONE SEASON	
FRADING PROGRAMS, 35 ILL. ADM.	
CODE 225, CONTROL OF EMISSIONS	
FROM LARGE COMBUSTION SOURCES,	
SUBPARTS A, C, D and E	

R06-26 (Rulemaking- Air)

## **TESTIMONY OF JAMES R ROSS**

## Qualifications

My name is Jim Ross and I am here today representing the Illinois Environmental Protection Agency (Illinois EPA) where I am the Manager of the Division of Air Pollution Control in the Bureau of Air.

I have a Bachelors of Science Degree in Mechanical Engineering from Southern Illinois University at Carbondale. I have completed numerous environmental courses over the years including the study of emissions and controls of each of the criteria air pollutants, many hazardous air pollutants, as well as several courses on the background and implementation of environmental regulations. I have also provided training on air pollution permitting and regulations to Illinois EPA and United States Environmental Protection Agency (U.S. EPA) staff, industry, environmental consulting firms, environmental organizations, and the general public.

I joined Illinois EPA in May of 1988 as a permit engineer in the Permit Section of the Division of Air Pollution Control. I became manager of the Clean Air Act Permit Program (CAAPP) Unit in May of 1997, after about a year and a half as acting CAAPP Unit manager. The CAAPP is Illinois' version of the federally mandated Title V program of the Clean Air Act that requires permits for all major sources of air pollution. In January of 2003, I became acting manager of the Permit Section and remained so until March of 2004. A short time later I transferred over to

Illinois EPA's Office of Emergency Response, where I was Manager of the Emergency Operations Unit. I remained in this position until October of 2005, when I returned to the Bureau of Air in my current position.

In addition to currently being the Division of Air Pollution Control Manager, I am also an Illinois EPA Duty Officer which requires me to be on call 24 hours a day, seven days a week during several periods throughout the year. In this capacity, I am responsible for ensuring Illinois EPA's response to emergencies incidents anywhere in the State, especially those involving hazardous materials, oil and fuel spills, disasters, and issues of homeland security.

In my 18 years with Illinois EPA I have been involved with the detailed review of Illinois' industrial processes and their emissions of air pollutants and the measures and controls used to mitigate these emissions. This review has included on-site visits to a wide-variety of processes, including steel mills, large chemical plants, refineries, and several coal-fired power plants. I have helped develop and implement several major programs and rules since their inception including the CAAPP and Illinois' volatile organic material trading program for the greater Chicago area, i.e., the Emissions Reduction Market System. As Permit Section Manager, I oversaw the permitting of over 6,000 facilities in the State. Of note is that I was deeply involved in the CAAPP permitting of Illinois' 22 coal-fired power plants, including representing Illinois EPA at several of the public hearings on the proposed permits for these plants.

In my current position as Division Manager, I supervise a staff of over 150 engineers, specialists, and administrative support personnel in developing, monitoring, and enforcing the State and Federal air pollution control requirements. In particular, and more recently, I have been overseeing Illinois EPA's efforts in the development of several rulemaking efforts, including the proposed CAIR and the proposed Illinois Mercury rule.

## Introduction

My testimony is intended to provide a broad overview of the proposed CAIR. Additional testimony is being provided to more specifically address different components of the proposed

rule. I would like to note that Illinois EPA performed substantial outreach to stakeholders on the proposed rule, including holding five weekly stakeholder outreach meetings where we presented information on our proposed approach, updated stakeholders on the rule, provided draft rule language, requested feedback on issues, and held question and answer sessions. We also provided regular mail and e-mail addresses to allow interested parties to submit comments and questions that were subsequently answered at the stakeholder meetings. In addition, we repeatedly offered to meet with any stakeholders in smaller groups to discuss the rule and related issues.

## Overview of Proposed Rule and Potential Impacts

The proposed rule is designed to control the emissions of sulfur dioxide (SO<sub>2</sub>) and nitrogen oxides (NO<sub>x</sub>) from electric generating units (EGUs) in Illinois. In the electric power sector, both gas turbines and steam turbines are used to produce rotary motion for electric generators. Gas turbines typically burn natural gas or distillate oils, whereas steam turbines utilize steam generated from boilers firing coal, fuel oils, or natural gas. Emissions of NO<sub>x</sub> and SO<sub>2</sub> are the result of fuel combustion in the boilers and gas turbines. The requirements of the proposed rule will affect 59 coal-fired boilers and 170 oil/gas-fired boilers and turbines. Affected EGUs are those having a generating capacity of 25 megawatts (MWe) and above. Certain cogeneration units are exempted from these proposed requirements if they supply, in a calendar year, less than one-third of the unit's potential electric output capacity or 219,000 megawatt hours (MWh), whichever is greater, to any utility power distribution system for sale.

In Illinois, EGUs are the largest sources of  $SO_2$  emissions to the atmosphere, and one of the largest sources of  $NO_x$ . Both  $SO_2$  and  $NO_x$  are precursors to the formation of fine particles or  $PM_{2.5}$  and  $NO_x$  is also a precursor to ozone formation. Control of these air pollutants is necessary for Illinois to comply with the federal CAIR promulgated on May 12, 2005. Air pollution originating from Illinois was found by U.S. EPA to contribute significantly to pollution problems in downwind states through the phenomenon of interstate air pollution transport. Specifically, pollution from Illinois was determined to have a significant contribution to nonattainment with the National Ambient Air Quality Standards (NAAQS) for 8-hour ozone and

 $PM_{2.5}$  in downwind states. In addition, U.S. EPA concluded that transported Illinois pollution interfered with the maintenance of areas that are in attainment with the NAAQS for 8-hour ozone and  $PM_{2.5}$ . Furthermore, modeling on both a regional scale and at the state level indicates that substantial reductions of  $NO_x$  and  $SO_2$  are necessary to attain the 8-hour ozone and  $PM_{2.5}$ NAAQS in Illinois.

The CAIR is intended to address transport of NO<sub>x</sub> and SO<sub>2</sub> by capping the emissions of these pollutants from large EGUs in the eastern United States through three separate emissions trading programs: (1) annual SO<sub>2</sub> trading program; (2) annual NO<sub>x</sub> trading program; and (3) ozone season NO<sub>x</sub> trading program. Alternatively, States can adopt rules that cap and achieve equivalent emissions reductions. CAIR allows, but does not require, affected states to opt-in to a two-phased cap and trade program administered by U.S. EPA. In order to comply with the federal CAIR, Illinois EPA is proposing to opt-in to U.S. EPA's cap-and-trade programs. For states electing to meet the CAIR requirements by opting-in to the trading programs, U.S. EPA established certain mandatory requirements, but allowed states flexibility in some areas, such as in determining the allocation methodology for allowances issued under the NO<sub>x</sub> annual and ozone season trading programs. States have almost no flexibility in implementing the  $SO_2$ trading program as it builds on the structure and requirements in the federal Acid Rain Program. States retain responsibility for permitting Acid Rain sources. The U.S. EPA administers most other aspects of this SO<sub>2</sub> program, including allocating SO<sub>2</sub> allowances. Under CAIR, affected states are required to meet statewide  $NO_x$  and  $SO_2$  emissions budgets. The first phase of  $NO_x$ reductions starts in 2009 (covering 2009-2014) and the first phase of  $SO_2$  reductions starts in 2010 (covering 2010-2014); the second phase of reductions for both NO<sub>x</sub> and SO<sub>2</sub> starts in 2015 (covering 2015 and thereafter).

For SO<sub>2</sub> the CAIR is derived from the Acid Rain Program administered by U. S. EPA. States do not have flexibility in terms of SO<sub>2</sub> allowance allocations or treatment of new units. The proposed Illinois rule incorporates by reference CAIR as it pertains to SO<sub>2</sub>. The CAIR SO<sub>2</sub> program provides that an SO<sub>2</sub> allowance allocated for a control period in a year before 2010 would be equivalent to one ton of sulfur dioxide emissions. An SO<sub>2</sub> CAIR allowance allocated during a control period 2010 through 2014 would be equivalent to .50 tons of sulfur dioxide.

Finally, an SO<sub>2</sub> CAIR allowance allocated for a control period in 2015 and thereafter will be equivalent to .35 tons of sulfur dioxide emissions.

For NO<sub>x</sub>, each affected state is given a separate emission budget of allowances for the seasonal and annual trading programs. The CAIR ozone season trading program retains the current NO<sub>x</sub> SIP Call budget for the ozone seasons of 2009 through 2014 and reduces the ozone season budget in 2015 and beyond. The current NO<sub>x</sub> trading program was established to meet the requirements of the NO<sub>x</sub> SIP Call and was adopted by the Illinois Pollution Control Board in 2000. The NO<sub>x</sub> SIP Call is a term commonly used to refer to U.S. EPA's call for revisions to state implementation plans (SIPs) to reduce NO<sub>x</sub> emissions in nonattainment areas. The CAIR NO<sub>x</sub> annual trading program extends the current NO<sub>x</sub> SIP Call trading program. The CAIR NO<sub>x</sub> annual trading program will require that EGUs control emissions year round or obtain NO<sub>x</sub> allowances equal to their annual NO<sub>x</sub> emissions.

The U.S. EPA allowed states flexibility in CAIR, in particular in determining the allocation methodology for allowances issued under the  $NO_x$  annual and seasonal programs. Illinois EPA is taking advantage of this flexibility. The proposed rule would distribute  $NO_x$  allowances for free, although the U.S. EPA allows states the flexibility to sell, auction, or charge a fee for such allowances.

Other notable areas where Illinois has utilized allowance allocation flexibility are:

- 1. Allocation of allowances on an electrical output basis, rather than a heat input basis;
- 2. Allocations occur three years in advance of the date they could be used;
- 3. Update allocations annually;
- 4. Set-aside 5% of the allowances for new units in both phases, instead of 5% in phase 1 and 3% in phase 2 as proposed by the model CAIR; and
- 5. Set-aside 25% of the allowance budget in a Clean Air Set-Asides (CASA) to be eligible for allocation seasonally and annually.

The proposed rule allocates allowances on an electrical output basis, rather than a heat input basis, to encourage energy efficiency. The proposed rule would make allocations only three

years in advance of the date they could be used, and would update allocations annually. Frequent allocation updates ensure that new units are rolled-in quickly and units that are retired or that reduce output are not given allowances greater than their proportiate share based on their current operation. Frequently updating the basis on which allocatons are made will distribute allowances more fairly to current power generators.

In addition, the proposed rule would set aside 5% of the allowances in order to ensure that new, cleaner and more efficient EGUs will have access to a fair share of the allowances. Since new units are subject to more stringent environmental regulations, they are generally more efficient, and employ newer technologies for generation and pollution control. The proposed regulation is intended to encourage investment in newer cleaner units to be built in Illinois for continued improvement in air quality.

U.S. EPA also allowed states the flexibility to provide a set-aside of allowances for energy efficiency (EE) and renewable energy (RE) projects, and suggests a set aside of at least 15%. Illinois EPA has proposed that 25% of the NO<sub>x</sub> budget be allocated seasonally and annually to a CASA. The primary goal of the CASA is to encourage and promote energy efficiency, renewable energy, conservation, and clean coal technology. The proposal establishes an EE/RE set-aside of 12% for demand-side energy efficiency projects. An additional 11% of the CASA is for clean technology projects. The remaining two percent of the allowances are given to either EE/RE or clean technology projects that commence operation early - before 2012. The CASA positions Illinois as a leader in providing incentives for investments in zero emission electrical generation, generation from renewable energy, and generation from clean coal technologies and is consistent with the Governor's Energy policy. In addition, we will be proposing an amendment to the CASA provisions that would allow sources subject to consent decrees that overcomply to apply for these allowances.

Illinois EPA also intends to retire the  $NO_x$  compliance supplement pool. Retirement of these allowances is beneficial to public health and the environment to the extent that it results in further  $NO_x$  emission reductions.

A number of control technologies are available to allow sources to meet the required emissions caps. For  $NO_x$ , it is anticipated that the most likely control will be the use of selective catalytic reduction (SCR) or selective non-catalytic reduction (SNCR) or a combination of these. For  $SO_2$ , flue gas desulfurization (FGD) is the most likely control technology to be employed. Participation in the trading programs will allow sources flexibility in controlling their emissions in a cost-effective manner. Sources that over control and/or comply early may be eligible to choose to bank or sell their emissions to help with costs, or to limit control and purchase needed allowances from the market.

To the extent that this proposal will help to attain the NAAQS in Illinois and downwind states, the reduction of  $NO_x$  and  $SO_2$  emissions should provide significant monetary and non-monetary health and welfare benefits. U.S. EPA estimates that the CAIR would provide health benefits of \$101 billion in 2015, by avoiding approximately 17,000 premature deaths, 22,000 non-fatal heart attacks, 12,000 hospitalizations for respiratory and cardiovascular diseases, 1.7 million lost work days, 500,000 school absences, and 10.6 million days when adults restrict normal activities because of respiratory symptoms exacerbated by air pollution. Welfare benefits may include both environmental and other societal benefits of reducing pollution, such as reductions in damage to ecosystems, structures, and monuments from acid rain, as well as improved visibility, and improvements in recreational and commercial fishing, agricultural yields, and forest productivity.

Positive economic impacts could occur as a result of the incentives for energy efficiency and renewable energy projects in Illinois, as well as clean-coal projects such as IGCC and circulating fluidized bed boilers. Illinois EPA utilized the services of ICF Resources Incorporated (ICF) to evaluate the economic impact of the proposed Illinois CAIR rule using the Integrated Planning Model (IPM<sup>®</sup>). This evaluation focused on the incremental impacts of the proposed rule over the impacts of the CAIR in terms of costs to the power sector and costs to electricity consumers. Overall, the implementation of the proposed rule has minimal effects, both in Illinois and across the nation. Average production costs are slightly higher in 2009 and then fall in 2015 and 2018. The retail electricity prices and costs across all sectors (residential, industrial, and commercial) remain unchanged as a result of the proposed rule.

#### Implications of the Proposed Illinois Mercury Control Rule

Illinois EPA currently has another, related rule pending before the Illinois Pollution Control Board, namely the proposed Illinois mercury rule, 35 Ill. Adm. Code 225, Control of Emissions from Large Combustion Sources (Mercury). Although this rule focuses on the control of mercury emissions, it contains an optional multi-pollutant standard (MPS) that companies can elect to comply with to satisfy the requirements of the rule. If a company chooses to comply with the proposed mercury rule via the MPS, then system-wide emissions limits on both SO<sub>2</sub> and NO<sub>x</sub> are applicable, with restrictions on trading of these emissions. Overall, the proposed Illinois Mercury rule and CAIR complement each other in their goal to reduce SO<sub>2</sub> and NO<sub>x</sub>.

A multi-pollutant approach for controlling the emissions of mercury,  $SO_2$ , and  $NO_x$  from EGUs can have numerous advantages over the traditional, single pollutant schemes. A multi-pollutant approach to controlling emissions can increase the benefits to public health and the environment, reduce pollution more cost-effectively, and offer greater certainty to both industry and regulators. Since mercury emission reductions can be obtained as a "co-benefit" from the control devices used to reduce  $SO_2$  and  $NO_x$ , it makes sense to allow companies the option to synchronize the control of these pollutants provided that public health and the environment are likewise positively impacted.

Under the MPS, companies can commit to voluntarily meet emission standards on both  $NO_x$  and  $SO_2$  and in exchange receive additional flexibility in complying with the mercury emission standards. The MPS also restricts the trading of allowances on reductions achieved that are the result of measures taken to comply with the  $NO_x$  and  $SO_2$  emission standards. Companies cannot sell or trade outside of Illinois or with other companies in Illinois, the allowances needed to meet the emission limits for  $NO_x$  and  $SO_2$  required by the MPS. Such allowances that are needed to meet the emission limits are required to be retired or surrendered to Illinois EPA. Any allowances remaining with the company as a result of overcompliance can be freely traded. Allowances from overcompliance occur when a company's actual emission rate is below that required by the MPS. The restrictions on trading are meant to ensure that the emissions

reductions required by the MPS will occur in Illinois and therefore provide substantial benefit to the public health and environment in Illinois. The emission reductions will assist Illinois in efforts to bring the Chicago and Metro East St. Louis nonattainment areas into attainment with the NAAQS for 8 hour ozone and PM<sub>2.5</sub> and/or help attainment areas maintain acceptable air quality, as well as meet our obligations under CAIR.

The most straightforward way to look at the interaction between the requirements of the MPS and the proposed CAIR is that companies that elect to utilize the MPS would need to comply with both rules. Compliance with both rules was contemplated and is accounted for in the MPS rule language. Pursuant to 225.233(f)(4) of the MPS, the MPS provisions do not prohibit companies from purchasing or otherwise obtaining allowances from other sources for purposes of complying with federal or state requirements such as the proposed CAIR. In essence, companies utilizing the MPS can purchase or obtain allowances from the general interstate market in order to meet the proposed CAIR requirements.

At the present time two of Illinois largest coal-fired power generating companies have indicated that they would utilize the MPS, specifically Ameren and Dynegy. These companies comprise roughly half of the coal-fired generating capacity in Illinois.

## **Conclusion**

The U.S. EPA is requiring Illinois to revise its State Implementation Plan to reduce  $SO_2$  and  $NO_x$  emissions, which are important precursors of  $PM_{2.5}$  (both  $NO_x$  and  $SO_2$ ) and ozone ( $NO_x$  only). Illinois is required to implement a program to control  $NO_x$  and  $SO_2$  consistent with the federal CAIR. Illinois EPA has proposed a rule that will satisfy these requirements and provide incentives for energy efficiency and renewable energy projects in Illinois, as well as clean-coal projects such as Integrated Gasification Combined Cycle. The proposed rule is both technically feasible and economically reasonable. The reductions in  $NO_x$  and  $SO_2$  should provide significant benefits to public health and the environment. These reductions will assist Illinois and downwind states in reaching attainment in nonattainment areas with the NAAQS for  $PM_{2.5}$  and 8 hour ozone and also maintain acceptable air quality in those areas which are in attainment with

the NAAQS.

We urge the Illinois Pollution Control Board to adopt the proposed Illinois CAIR.

## **BEFORE THE ILLINOIS POLLUTION CONTROL BOARD**

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IN THE MATTER OF:
PROPOSED NEW CAIR SO <sub>2</sub> , CAIR NO <sub>X</sub>
ANNUAL AND CAIR NO <sub>X</sub> OZONE SEASON
TRADING PROGRAMS, 35 ILL. ADM.
CODE 225, CONTROL OF EMISSIONS
FROM LARGE COMBUSTION SOURCES,
SUBPARTS A, C, D and E

R06-26 (Rulemaking- Air)

## TESTIMONY OF JACQUELYN SIMS

My name is Jacquelyn "Jackie" Sims. I am here today for the Illinois Environmental Protection Agency (Illinois EPA), where I am an environmental engineer in the Compliance unit of the Compliance and Enforcement Section of the Division of Air Pollution Control in the Bureau of Air. As part of my duties, I assist with the implementation of the NOx Trading program, address compliance and enforcement issues, and assist with the development of regulatory proposals. I also currently am involved with the 1990 Clean Air Act, Section 507 Small Business Environmental Assistance Program (SBEAP). Prior to moving to the Compliance Unit, I was a permit engineer in the Permit Section in the Division of Air Pollution Control. I joined the Illinois EPA in June of 1989.

I have a Bachelor of Science degree in Industrial Engineering from the University of Illinois, Champaign-Urbana and have some graduate studies. I have completed numerous environmental courses over the years including completion of a comprehensive training program that resulted in me becoming a Certified Energy Manager through the Association of Energy Engineers. I have also provided training on air pollution permitting and regulations to persons from industry, consulting firms, associations and the general public.

The purpose of my testimony is to provide explanation for how allowances will be allocated under the proposed Illinois CAIR NOx rule.

#### Allocation Methodology:

The CAIR model rule allows the States flexibility in the cost, distribution, and frequency of allocations and the use of set-asides. Illinois EPA's allocation methodology was chosen to encourage energy efficiency and development of renewable energy resources. With respect to whether the Illinois EPA should sell allowances, auction or otherwise charge electric generating units for NOx allowances, Illinois EPA has opted to allocate 75 percent of its allowance budget without charge to help reduce the cost of compliance to existing and new electric generating units, and to ensure that smaller and publicly owned units would not be disadvantaged. Other allowances will be allocated based on the policy considerations of encouraging energy efficiency and renewable energy, as well as pollution abatement and early reductions. These considerations are addressed by other witnesses.

Under the proposed rule Illinois EPA will be allocating NOx allowances on the basis of gross electric output, as described in Rory Davis' testimony.

With respect to the frequency of allocations, a state is allowed to choose to distribute CAIR NOx allowances based on either historical data, or on current data which are updated frequently. Allocations in the model CAIR rule are made six years in advance and use five years of historical data to determine a fixed heat input baseline. The model CAIR rule also provided that once the 5-year historical baseline has been established, a unit would indefinitely receive the same number of allowances even if the level of power has been reduced or ceases. Illinois EPA has opted to update a source's allocations by using more current operational data on a yearly or seasonal basis after the initial set of control periods. Changes in the gross generation

or efficiency of a unit are more accurately reflected under the proposal as new units begin obtaining allowances from the general pool sooner, and existing units that shutdown or decline in operation do not receive allowances indefinitely or at levels not reflective of actual operation. This is consistent with the purpose of an output-based allocation methodology.

Under the proposed rule, allocations for the control periods 2009, 2010 and 2011 shall be based on the average of the three highest gross electrical outputs from 2001, 2002, 2003, 2004 and 2005 data. The gross electrical output from each affected unit shall be reported to Illinois EPA initially for the above years, then on a quarterly basis thereafter. Sources have a choice during this initial period of submitting heat input data or electrical output data. The heat input data for the years 2001-2005, would be data accepted by USEPA and then converted to gross electrical output by assuming 33 percent efficiency. The gross electrical output or the heat input data will then be converted to include the effect of fuel as stated in the proposed rule.

In addition, Illinois EPA decided to promote a faster roll-in of data for existing sources as well as newer sources by using the average of the previous two years' gross electrical output for the control periods 2012 and thereafter. In cases where two years of data are not available, then the year prior to the allocation year will be used. Updating the allocations more frequently by using more recent data impacts new units as well as units that are shutdown or partially shutdown by allowing new electric generating units to receive allowances from the larger pool sooner and for shutdown units to cease receiving allowances sooner after operations stop, respectively.

The flexibility with respect to the size of set-asides allows a state to set a portion of allowances aside for new units and for energy efficiency and renewable energy sources. Illinois EPA opted to follow the model rule and set aside five percent for new units. The proposal

differs from the model rule in that the five percent is consistent throughout the life of the program and doesn't reduce as provided for in the model rule. The portion of allowances setaside for energy efficiency and renewable energy projects has been proposed at twenty-five percent. Therefore seventy percent of the State's annual and seasonal allocations, 53,361 annual and 30,701 seasonal allowances for control periods 2009-2014 and 44,468 annual and 21,491 seasonal allowances for control periods 2015 and thereafter, will be distributed to existing electric generating sources each year. If the total eligibility for allowances exceeds these budgets, then allowances will be distributed on a pro-rata basis.

## New Units:

In the CAIR model rule, new units are allowed to receive allowances from the new unit set-aside (NUSA) for 11 years from a pool representing five percent of the total allowances for 2009-2014 and only three percent for 2015 and after. In the proposed rule, new units are those that have been built and have commenced commercial operation after January 1, 2006. The rule proposes five percent of total allocations will be available for new units each year throughout the life of the program. This is more reflective of the number of new units expected to be constructed in Illinois. After a new unit has operated in one control period, it becomes an existing unit and qualifies for allocations for the control period commencing four years into the future. The new unit will receive allowances from the new unit portion until that time.

In conclusion, more frequent and less historically dependent updating of allocations is consistent with the purpose of an output-based allocations methodology.

STATE OF ILLINOIS	)	
	)	SS
COUNTY OF SANGAMON	)	
	)	

## **CERTIFICATE OF SERVICE**

I, the undersigned, an attorney, state that I have served electronically the attached

TESTIMONY OF GARY E. BECKSTEAD, DAVID E. BLOOMBERG, ROSTON

## COOPER, RORY DAVIS, ROBERT KALEEL, YOGINDER MAHAJAN, JAMES R.

ROSS AND JACQUELYN SIMS upon the following person:

Dorothy Gunn Clerk Illinois Pollution Control Board James R. Thompson Center 100 West Randolph St., Suite 11-500 Chicago, IL 60601-3218

and mailing it by first-class mail from Springfield, Illinois, with sufficient postage affixed to the following persons:

## SEE ATTACHED SERVICE LIST

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY,

Rachel L. Doctors Assistant Counsel Division of Legal Counsel

Dated: September 22, 2006

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