

## Appendix C

### HEARING OFFICER'S REPORT

TO: The Honorable John A. Hughes  
Secretary, Department of Natural Resources and Environmental Control

FROM: Robert P. Haynes, Esquire  
Senior Hearing Officer, Office of the Secretary  
Department of Natural Resources and Environmental Control

RE: Proposed Regulation No. 1146 to Delaware Regulations Governing Control of Air Pollution (Establishing Limits on the Emission of Nitrogen Oxides, Sulfur Dioxide and Mercury from Residual Oil or Coal-Fired Electric Generating Units Rated 25 Megawatts or More of Generating Capacity), and  
Proposed Delaware Plan under Clean Air Act Section 111(d) for the Control of Mercury Emissions from Coal-fired Electric Steam Generating Units.

DATE: November 14, 2006

#### **I. BACKGROUND AND PROCEDURAL HISTORY**

On November 7, 2005, the Secretary of the Department of Natural Resources and Environmental Control ("Department" or "DNREC"), John A. Hughes, approved Start Action Notice ("SAN") No. 2005-09. This action occurred after almost two years of discussions between the Department's Division of Air and Waste Management ("DAWM"), Air Quality Management Section ("AQM"), and the owners of Delaware's eight largest coal or oil-fired electric generating units ("EGUs"). The EGUs are: Conectiv Delmarva Generating, Inc.'s Edge Moor Generating Station Units 3, 4 and 5, City of Dover's McKee Run Generating Station Unit 3, and NRG Energy, Inc.'s Indian River Generating Station Units 1, 2, 3 and 4. These informal discussions sought from the EGUs voluntary plans for reducing their emissions of pollutants. The Department did not receive any acceptable voluntary plan, but the discussions assisted the Department in understanding many of the issues and the EGUs' concerns. The Department appreciates

the time and effort spent in trying to achieve a collaborative resolution to reduce the emissions of harmful air pollutants in Delaware.

The SAN No. 2005-7 stated the proposed regulation's purposes as follows:

- 1) Aid in Delaware's attainment of the State and National Ambient Air Quality Standards ("NAAQS") for ground-level ozone by 2010.
- 2) Aid Delaware in making a demonstration of reasonable progress towards attainment of the State and the NAAQS for ground-level ozone NAAQS in 2007.
- 3) Aid in Delaware's attainment of the State and NAAQS for fine particulate matter by 2010.
- 4) Address local-scale fine particulate and mercury problems attributable to coal and residual oil fired EGUs.
- 5) Satisfy Delaware's obligation under the Clean Air Interstate Rule ("CAIR"), and the federal Nitrogen Oxides Transport State Implementation Plan ("SIP") Call.
- 6) Satisfy Delaware's obligation under the federal Clean Air Mercury Rule ("CAMR").
- 7) Satisfy EPA's finding that Delaware failed to submit a Clean Air Act Section 110 SIP addressing upwind interstate transport for the ozone and fine particulate matter NAAQS.
- 8) Improve visibility and help satisfy Delaware's EGU-related regional haze obligations.

The above stated purposes identify several federal regulatory programs, which the United States Environmental Protection Agency ("EPA") administers under the Clean Air Act, as amended. The Department also is responsible for the administration of these programs in Delaware under EPA's delegation of certain of its regulatory authority. In addition, the Department has its own state regulatory authority in *60 Del. C. Chapter 60* to regulate air pollutants in order to protect Delaware's environment and its public health.

The federal air pollution control programs are designed to improve the air quality through series of regulations that require sources of air pollution to reduce their emissions. EPA established National Ambient Air Quality Standards ("NAAQS"), which impose certain legal obligations on each state, and Delaware, which EPA includes in its

multi-state Philadelphia region that is classified as an ozone and fine particulate matter non-attainment area, must periodically demonstrate this state's efforts and progress towards attaining cleaner air that meets NAAQS.

In 1998, EPA issued regulations to reduce air emissions of nitrogen oxides ("NOx"), which is a precursor to ozone that is subject to NAAQS. This regulation, known as NOx SIP Call, instituted a method of environmental regulation, which was dependent of economic market forces to determine when and where emissions reductions would occur. This form of regulation allowed NOx emissions trading, which allowed sources of NOx emissions an alternative to investing in pollution control equipment. Instead of investing in pollution control equipment, the sources of this pollution could purchase emission allowances, or, in effect, buy their compliance and continue to pollute at the same levels as before. EPA in 2005 also issued the Clean Air Interstate Rule ("CAIR") to further regulate NOx and to include the regulation of sulfur dioxide ("SO<sub>2</sub>") emissions. These federal programs also allowed emissions trading as an alternative to actual emission reductions from a source. EPA also in 2005 issued the Clean Air Mercury Rule ("CAMR") to regulate mercury emissions, which is an air pollutant that directly contaminates the air, and water, and can be harmful to humans, particularly children and pregnant women. Again, EPA approved emissions trading of mercury emissions as a regulatory alternative to actual emissions reductions through installing pollution control equipment or other operational changes.

The Department's SAN 2005-07 addresses the need for Delaware to take specific regulatory action to meet the federal regulatory deadlines that require Delaware to demonstrate by 2007 dramatic progress towards improving Delaware's air quality to meet

the NAAQS deadline of cleaner air before 2010. Consequently, the Department contacted interested persons to participate in the regulatory development process, including the formation of an ad hoc stakeholders' committee. The committee included the representatives of the EGUs, civic organizations, the business community, and environment organizations. The committee met January 30, 2006, March 9, 2006, April 6, 2006, May 23, 2006, and June 6, 2006.

On July 2, 2006, the Department issued to the committee a draft of the proposed regulation, which would establish operating rate limits (lb./mmBtu) and the annual mass limits (tons/yr) for NO<sub>x</sub>, SO<sub>2</sub> and mercury emissions. The Department published notice of three public workshops, which were held July 31, 2006, in New Castle County, August 1, 2006, in Kent County, and August 2, 2006, in Sussex County.

The Department's experts in AQM developed the draft emissions after considering the availability and feasibility of pollution control equipment, including equipment installed in other states on comparable units over a comparable time period. The Department's experts also considered the EGUs' positions, which are summarized as contesting the Department's experts' opinion that installing pollution control equipment could and should be installed. Representatives on the committee from civic and environmental groups advocated even stricter limits than the Department's limits as set forth in its July 2, 2006, draft proposed regulation.

The Department's experts considered the committee's comments, and made some revisions, which the Department on July 15, 2006, sent to the committee as a proposed regulation. On September 1, 2006, the Department published in the *Delaware Register of Regulations* "Electric Generating Unit (EGU) Multi-Pollutant," which if approved would

become Regulation 1146 in the Delaware Regulations Governing Control of Air Pollution. In addition, the Department also published notice of Delaware's proposed 'CAA Section 111(D) State Plan for the Control of Mercury Emissions from Coal-fired Electric Steam Generating Units (EGU)' ("Plan"). This Plan indicated that the proposed regulation would regulate mercury emissions from the coal-fired EGUs, and that the proposed regulation, if adopted, would be Delaware's submission to EPA for compliance under CAMR.

The Department held public hearings on proposed regulation 1146 and the Plan on September 25, 2006, in Dover, on September 27, 2006, in New Castle, and on September 28, 2006, in Georgetown. The public comment period for written comments remained open until October 2, 2006. At the hearing, several participants moved that it be kept open longer, but I denied these motions in an October 12, 2006, ruling, which is incorporated by reference into this Report.

## **II. SUMMARY OF THE RECORD**

The record includes a verbatim transcript of the public hearings, as noted above. I admitted numerous documents into the record as hearing exhibits, including from the following: the Department, NRG, CDG, City of Dover, Green Delaware, Center for Energy & Economic Development ("CEED"), the Sierra Club, Delaware Chapter, League of Women Voters, Delaware Nature Society, the staff of the Public Service Commission ("PSC"), the Delaware State Chamber of Commerce, International Brotherhood of Electrical Workers, Local No. 1238 ("IBEW"), Delaware Electric Cooperative, and several individuals.

At the September 25, 2006, public hearing, Robert Clausen, on behalf of AQM, presented the Department's exhibits into the record. Mr. Clausen, and other representatives from AQM, Ronald Amirikian and Ali Mirzakhali, answered the public's questions at the public hearings. The public comment period and hearing record closed on October 2, 2006. The Department received post-hearing comments by mail and e-mail, which are included in the record. The Department submitted into the record a Technical Support Document ("TSD"), which AQM's experts prepared to assist my understanding of the complex and technical issues. I did not participate in the regulatory development process or ad hoc committee meetings, and the TSD was useful in my understanding of the proposed regulation's many complex issues. The TSD included the Department's research and source materials in documents TSD 1 through TSD 120, and the Department previously had disclosed most of these source materials during the regulatory development process, including posting on the Department's web site. Also, all of the source documents were generally available to the public through the EPA, equipment vendor, etc. websites.

I have considered all timely and relevant public comments that the Department received, and they are included in the record.

The public hearing and public comment records may be summarized by two opposing positions, both of which sought changes to the proposed regulation. The EGUs' owners, namely, NRG, CDG, and Dover opposed the proposed regulation and their arguments may be summarized as follows: 1) a regulation is not needed because of the federal programs will reduce emissions of the three pollutants; 2) the cost to comply with the regulation would be too high for the EGUs, 3) the proposed regulation's deadlines for

the EGUs to comply with the emission limits do not allow sufficient time to install the pollution control equipment. The comments also raise questions concerning the proposed regulation underlying research and studies, and offer other studies and research to support their positions.

There also was opposition to the proposed regulation from individuals and representatives of civic and environmental groups. This opposition sought the Department to impose even more stringent limits on the EGUs, including requiring some units to cease operating, particularly the EGUs in Sussex County. The other issue was to regulate directly emitted particulate matter (“PM”).

Following the close of the public comment period, I requested the Department’s experts in AQM to prepare a response to the technical public comments, which AQM prepared and which is attached hereto as Appendix A. This provides a detailed summary and response to the more technical public comments. Based upon the public comments, AQM also recommends certain minor revisions to the proposed regulation. This recommended proposed regulation is set forth in Appendix B hereto. AQM provided reasons for the three minor revisions, and offers its expert opinion that the minor revisions are not substantive.

### **III. DISCUSSION AND REASONS**

The purpose of the proposed regulation 1146 may be simply stated as intending to improve air quality in Delaware by reducing large emissions of three harmful pollutants. Proposed regulation 1146 will reduce emissions of NO<sub>x</sub> from its 2005 level of 10,419 tons to 7,942 tons in 2009, for a reduction of 24%. Similarly, it will reduce SO<sub>2</sub> emissions from its 2005 level of 30,482 tons to 2009 limits of 14,295 tons, for a 53%

reduction. Finally, proposed regulation 1146 also will impose limits on mercury emissions, which is a pollutant that is currently not subject to any regulatory limits or even monitoring. The Department estimates that proposed regulation 1146 will reduce mercury emissions by 70% in 2009 and by 82% in 2013. Thus, proposed regulation 1146, if approved, will dramatically reduce the emissions of NO<sub>x</sub>, SO<sub>2</sub> and mercury in Delaware.

The improved air resulting from approval of regulation 1146 will benefit the environment and public health, which suffers from exposure to polluted air. Proposed regulation 1146, if approved, will be added to the Department's other air pollution control regulations in "Delaware Regulations Governing Control of Air Pollution."

Based upon my review of the record, I find that the Department has a reasonable basis for proposed regulation 1146. First, the Department reasonably selected the three pollutants to be reduced in order for Delaware to comply with NAAQS and CAMR. Second, the Department reasonably determined that the eight EGUs should reduce emissions of the three pollutants consistent with their contribution to Delaware's failure to meet the NAAQS and CAMR federal requirements. Third, the Department reasonably considered known and proven pollution control equipment, which the EGUs could install to reduce the emission of the three pollutants. Fourth, the Department reasonably calculated the amount of emissions reductions that the pollution control equipment could produce if installed on each EGU, and developed operating and annual mass limits based upon installing the pollution control equipment. Fifth, the Department developed an implementation schedule that included phasing the limit's effective dates to allow an adequate and reasonable amount of time to install the pollution control equipment.

Finally, the Department included necessary monitoring and compliance reporting to ensure ongoing regulatory review and the ability to identify and enforce any violations.

The Department's first determination was to select the pollutants for reductions. The selection of NO<sub>x</sub>, SO<sub>2</sub> and mercury as the pollutants subject to the proposed regulation 1146 is driven by the federal regulations, particularly NAAQS and CAMR. The record includes an ample evidence of the adverse health consequences from these pollutants. NO<sub>x</sub> and SO<sub>2</sub> produce ozone, which causes a series of adverse health consequences, as discussed below:

NO<sub>x</sub> contributes to the formation of ground level ozone (smog) by reacting with volatile organic compounds (VOC's) in the presence of heat and sunlight. Short term exposure to ozone can cause rapid, shallow breathing and related airway irritation, coughing, wheezing, shortness of breath, and exacerbation of asthma, particularly in sensitive individuals and asthmatic children. Short term exposure also suppresses the immune system, decreasing the effectiveness of bodily defenses against bacterial infections. Research studies indicate that markers of cell damage increase with ozone exposure. Some studies suggest that there is a link between ozone exposure and premature death of adults and infant death. Other studies indicate a link between ozone and premature birth and adverse birth outcome, cardiovascular defects, and adverse changes in lung structure development in children.

Children, the elderly, those with chronic lung disease, and asthmatics are especially susceptible to the pulmonary effects of ozone exposure.

Ozone also adversely affects trees and vegetation and can cause reduced crop yields.

In its CAIR analysis, the US EPA identified Delaware sources as contributing to 8-hour ozone standard non-attainment in thirteen areas in three states.

TSD at 7.

The record also includes ample support for finding that emissions of SO<sub>2</sub> should be regulated and reduced because of its considerable adverse impact on air quality, as discussed in greater detail below: .

SO<sub>2</sub> is an irritant that studies have shown to exacerbate respiratory disease such as asthma, coughing, wheezing, shortness of breath, and reduced lung function. Inhalation of SO<sub>2</sub> is associated with upper respiratory symptoms including nasal congestion and inflammation. Studies have linked SO<sub>2</sub> exposure to bronchial reactions, reduced lung function, and premature death.

SO<sub>2</sub> gas may be toxic following only a few minutes of exposure. Exercising asthmatics may experience lung constriction within five to ten minutes of exposure.

Children, the elderly, those with chronic lung disease, and asthmatics are especially susceptible to the effects of SO<sub>2</sub> exposure.

SO<sub>2</sub> has been associated with premature birth, low birth weight and increased risk of premature death at low levels of exposure. Reproductive effects such as reduced sperm quality have also been linked to sulfur dioxide exposure.

Studies indicate that SO<sub>2</sub> tends to have more toxic effects when acidic pollutants, liquid or solid aerosols, and particulates are also present.

SO<sub>2</sub> can react with other chemicals in the air to form sulfate particles. When breathed, these sulfate particles gather in the lungs and are associated with increased respiratory symptoms and disease, difficulty in breathing, and premature death.

SO<sub>2</sub> emissions are a contributor to acid rain by the reaction of the SO<sub>2</sub> with other chemicals in the atmosphere to form acids. Acid rain damages forests and crops, changes the makeup of soil, and makes lakes and streams acidic and unsuitable for fish. Ecosystem damage can occur and cause species shift in affected areas.

SO<sub>2</sub> has been shown to injure many plant species at low levels of exposure. Some of the most sensitive plants can be found in Delaware, including pines, alfalfa, and blackberry. SO<sub>2</sub> contributes to reduced visibility by contributing to the formation of sulfates in the atmosphere.

SO<sub>2</sub> is a PM<sub>2.5</sub> precursor, and the predominate PM<sub>2.5</sub> source in the summer. PM<sub>2.5</sub> can adversely affect health and contribute to visibility impairment.

TSD at 8.

Finally, mercury poses a severe public health risk from its bioaccumulation in the food chain, particularly in fish and shellfish.

Methylmercury is an organic formed when the elemental mercury makes its way to rivers, lakes and oceans where aquatic microbes convert the elemental mercury to methylmercury through a biochemical reaction. The methylmercury may then accumulate in fish and shellfish, leading to dietary exposure to methylmercury through consumption of affected fish and shellfish. Methylmercury is a neurotoxin that interferes with brain development. It readily crosses the placenta, and fetal blood levels may be equal to or slightly higher than maternal levels. It is actively transported to the fetal brain where it interferes with nerve cell differentiation and division by binding with DNA and RNA. It also interferes with nerve cell migration and prevents the development of normal brain structure. High dose exposure during fetal development can result in low birth weight, small head circumference, severe mental retardation, cerebral palsy, deafness, blindness, and seizures. Severely affected children may be born to mothers who exhibited no symptoms of methylmercury toxicity during pregnancy.

Lower dose exposure from maternal consumption of methylmercury contaminated foods may cause more subtle neurodevelopmental damage that is not evident until later in childhood. Recent studies have found that prenatal exposure has caused or contributed to deficits in fine motor function, attention span, visual-spatial abilities, and memory.

Infants and children are more potentially susceptible to methylmercury neurotoxicity than older children or adults because the brain continues to grow and develop dramatically for the first several years of life. Infants and children may be exposed through breast milk and other foods in their diet.

A study conducted in Texas, fourth in states of highest reported mercury emissions, concluded that there was a significant increase in the rates of special education students and autism rates associated with increases in environmentally released mercury. The study indicated that for each 1000lb of environmentally released mercury, there was a 43% increase in the rate of special education services and a 61% increase in the rate of autism.

Mature nervous systems can be adversely and permanently affected by methylmercury. Methylmercury causes nerve cell death and scarring in selected areas of the brain. Severity of the effects increases with increased exposure. Effects from low to moderate chronic exposure range from numbness and tingling of fingers, toes, mouth and lips to stumbling and generalized weakness. More acute exposures can cause a range of effects from decreased vision and hearing, tremor, and finally coma and death at high exposures.

Some information suggests that there is a link between methylmercury exposure and increased risk of high blood pressure, heart rate abnormalities, and heart disease. Information suggests that these symptoms develop following exposure during fetal development as well during adulthood. More research is being conducted in this area.

Mercury contamination of fish across the United States is so pervasive that health departments in 45 states have issued fish consumption advisories. Eleven states have consumption advisories for every inland water body for at least one fish species. Eleven states have also issued advisories urging women and children to limit consumption of canned tuna.

The State of Delaware Division of Fish and Wildlife has issued fish consumption advisories. In its 2006 Delaware Fish Consumption Advisories, mercury has factored into consumption advisories for fish in the Delaware River, the lower Delaware River and Delaware Bay, Saint Jones River, Dover's Silver Lake, Becks Pond, and Delaware's Atlantic coastal waters including the inland bays.

TSD at 10-12.

There is no dispute that these three pollutants are harmful, and that these emissions should be reduced to improve the environment and public health. The pollutants are subject to existing federal regulations and regulation by other states. This means that there is considerable information available on controlling the emissions of these pollutants, particularly from large sources like EGUs. In addition, there is considerable known and proven pollution control equipment and technology available to reduce the emission of harmful pollutants from large sources.

The Department's second step in proposed regulation 1146 was to select the sources targeted for emission reductions. The Department has selected several sources in other final or pending regulatory actions, but proposed regulation 1146 applies to eight EGUs. The EGUs' selection was based on their contribution to Delaware's air quality problems. The eight EGUs represent the majority of the emissions of pollutants in Delaware from stationary sources. Indeed, two of the eight EGUs are the largest sources of air pollution in Delaware, as shown on the Department's annual Toxic Release Inventory. The eight EGUs together represent 55% of Delaware's NO<sub>x</sub> emissions from stationary sources, and approximately 16% of the total NO<sub>x</sub> releases. Similarly, the eight EGUs account for approximately 74% of Delaware's SO<sub>2</sub> emissions from stationary sources and approximately 65% from all sources. Finally, the six coal-fired EGUs produce approximately 77% of all Delaware's mercury air emissions. Thus, for Delaware to attain cleaner air in order to comply with NAAQS, the Department reasonably selected the EGUs as appropriate sources to reduce their emission levels.

I also find that the Department's selection of the eight EGUs for emissions reductions also is supported by the EGUs' legal and regulatory status. The eight EGUs are older facilities. The oldest, Edge Moor Unit 3 was built in 1954, followed by Indian River Unit 1 built in 1957, Indian River Unit 2 built in 1959, Edge Moor Unit 4 built in 1966, Indian River Unit 3 built in 1970, Edge Moor Unit 5 built in 1973, McKee Run Unit 3 built in 1975, and the most modern EGU, Indian River Unit 4 built in 1980. Indeed, the EGUs were built prior to the effective date of most of the CAA's federal regulations, which provides them with "grandfathered" regulatory status under the CAA and its regulations. Based upon this status, the Department must allow the EGUs to

continue to operate with permits that regulate their operations based upon the air pollution controls installed when the EGUs were built or last upgraded. Thus, the Department is now proposing regulation 1146 to require the EGUs to install modern air pollution controls.

The Department, under *7 Del. C., Chapter 60*, enables the Department to exercise its state authority to protect Delaware's environment and public health, including establishing regulations that limit the emission of air pollutants more than limited by federal regulations. The Department developed proposed regulation 1146 only after determining that the federal programs have not and will not effectively and sufficiently regulate the eight EGUs' emissions of harmful pollutants. The effective state regulation of the eight EGUs is needed in order that Delaware may improve its air quality and comply with NAAQS and the CAMR.

Proposed regulation 1146 will require the EGUs to reduce their emissions through the installation of pollution control equipment. Proposed regulation 1146 will remove the EGU's option of relying on the federal programs' cap and trade method as a way to avoid installing pollution control equipment. These cap and trade programs may work to produce cleaner air on average nationally, but they have not worked in Delaware, and the Department has reasonably determined that they are unlikely to work to improve Delaware's air quality in time to meet Delaware's NAAQS deadlines.

The Department's exercise of its state regulatory authority also was undertaken when it became evident to the Department's experts that the federal air pollution control programs would not work to reduce emissions in Delaware. The federal programs will allow the EGUs to purchase clean air allowances as a lower cost alternative. The higher

cost alternative is installing pollution control equipment, which would directly produce cleaner air in Delaware. The Department's experts noted that the EGUs' purchase of clean air allowance are projected to increase the EGUs emissions in Delaware, and this is consistent with Delaware's experience under one federal program that has been in effect for several years. Simply stated, the federal market based programs have not and are not expected to work to clean Delaware's air. While they may reduce emissions in other states, and while they may result in less pollution being transported into Delaware from upwind states, they will not reduce the emissions from within Delaware. Thus, the Department's exercise of its state authority is appropriate in the face of Delaware's experience with a federal program that has and will not produce any state environmental in improved air quality and reduced Delaware emissions from these large sources of air pollution and public health benefits.

The grandfathered status allows these EGUs to operate without the considerable capital investment in pollution control equipment. The Department's experts note that comparable EGUs in other states installed pollution control equipment, and these EGUs are able to sell electricity. TSD at 47-53. Delaware's EGUs, however, claim that they may not be able to operate economically because of the cost that the proposed regulation would impose on the EGUs to install and operate the pollution control equipment required to comply with proposed regulation 1146. The Delaware EGUs now have an unfair economic advantage in the deregulated generating electricity supply market over EGUs that have installed pollution control equipment. The record includes discussions of the EGUs competing on a level "playing field" and comparing the proposed regulations to those in other states. This comparison assumes that everyone is playing by the same

rules, but these grandfathered EGUs clearly are not, as they have few rules now to follow. Thus, proposed regulation will require Delaware's EGUs to install pollution control equipment in order to compete in the electric supply market, where most EGUs already effectively compete even after the installation of comparable pollution control equipment.

The Department recognizes that Delaware's EGUs have an important role in maintaining the reliability of electric service. Proposed regulation 1146 should allow the EGUs to continue to operate as before. Nevertheless, should the EGUs decide to cease their operations, then the PJM Interconnection, which is a multi-state regional transmission and control agency and electric energy market, will respond to maintain system reliability. PJM controls the operation of its members' EGUs, including the Delaware's EGUs. The PJM's EGUs operate based upon an economic dispatch, which means the lowest cost units operate before operating higher cost units, which are only operated as required for reliability purposes.

The system reliability also was enhanced by the completion in 2006 of a new 230 kilo volt transmission line, which will transmit considerably more electricity north and south in Delaware. This transmission line reduces the dependence on EGUs located in Kent and Sussex Counties. The Department recognizes that this provides a measure of improved reliability in the event that the EGUs decide to cease operating.

The Department's experts recognized that under the federal programs, the market is supposed to operate to determine which of the EGUs will receive air pollution control equipment. Under EPA's Integrated Planning Model ("IPM"), as used to support the federal cap and trade programs' results, Delaware's EGUs were not predicted to install any pollution control equipment, but were to choose to make the low cost alternative of

acquiring pollution allowances under the cap and trade programs. The IPM extended its economic analysis as far as 2020. Consequently, without this state action the EGUs are expected to not invest in pollution control equipment. Thus, this state action is appropriate to regulate and require that the EGUs reduce their pollution if they want to continue to operate.

The federal program's market-based environmental remedy, while it will reduce emission transported into Delaware from upwind states, actually will harm Delaware's environment and public health by resulting in an increase in emissions within Delaware. This is an unacceptable environmental solution for Delaware. For Delaware, this means more emissions from the EGUs, less clean air and more harm to the environment and public health. The problem with the federal, market based regulatory scheme is that it will not work for Delaware. The Department's proposed regulation is designed to require the EGUs to make the long overdue investment in pollution control equipment in order to reduce the Delaware emissions of the three most harmful air pollutants. In sum, I find that the EGUs should contribute towards Delaware's need to reduce emissions in order to comply, and the proposed regulation has a reasonable basis in selecting the EGUs for reduced emissions. .

The Department's third step in developing a reasonable regulation was to review available technical and industry source material on methods and equipment to reduce the emissions of the three pollutants from EGUs. The experts determined that selective catalytic reduction ("SCR") pollution control equipment can dramatically and economically be installed to lower the EGUs' NO<sub>x</sub> emissions. TSD at 29-30. Similarly, they determined that flue gas desulfurization ("FGD") is a known and proven pollution

control equipment that can economically be installed to reduce the EGUs' SO<sub>2</sub> emissions. This equipment is commonly known as scrubbers. TSD at 31-33. Finally, they determined that activated carbon injection is available and could be economically installed to reduce the EGUs' mercury emissions. TSD at 33-34. The EGUs generally agree on the technical feasibility of the available control technology, and dispute the economic feasibility of these pollution control equipment and technology, but I find that the Department's experts' opinions are based upon sound technical and scientific support. I find that the limits have a well-supported technical basis.

The fourth step was to calculate the emission levels for each EGU based upon the installation of the pollution control equipment that was identified. The Department's limits establish operating and mass levels based upon reasonable operations of each EGU. The results of the limits are summarized below, as shown in the TSD, along with the possible emissions possible if the Department does not control the emission through proposed regulation 1146:

<u>NO</u> <u>x</u> <u>An</u> <u>nua</u> <u>l</u> <u>Em</u> <u>issi</u> <u>ons</u>	<u>P</u> <u>h</u> <u>a</u> <u>s</u> <u>e</u> <u>I</u> <u>(t</u> <u>o</u> <u>n</u> <u>s)</u>	<u>P</u> <u>h</u> <u>a</u> <u>s</u> <u>e</u> <u>II</u> <u>(t</u> <u>o</u> <u>n</u> <u>s)</u>
200 2 Act ual	8, 1 4 3	8, 1 4 3
CA IR All ocat ion	3, 3 4 1 ( 2 0	2, 8 4 2 ( 2 0

	0 9 )	1 5 )
IP M Pre dict ed	1 0, 6 4 1	1 0, 9 8 4
Pro pos ed Cap	7, 9 4 2 ( 2 0 0 9 )	7, 9 4 2 ( 2 0 0 9 )

<u>S</u> <u>Q</u> 2 <u>A</u> <u>n</u> <u>n</u> <u>u</u> <u>a</u> <u>l</u>  <u>E</u> <u>m</u> <u>i</u> <u>s</u> <u>s</u> <u>i</u> <u>o</u> <u>n</u> <u>s</u>	<u>P</u> <u>h</u> <u>a</u> <u>s</u> <u>e</u>  <u>I</u>  ( <u>t</u> <u>o</u> <u>n</u> <u>s</u> )	<u>P</u> <u>h</u> <u>a</u> <u>s</u> <u>e</u>  <u>I</u>  ( <u>t</u> <u>o</u> <u>n</u> <u>s</u> )
2 0 0 2  A c t u a l	3 1 , 1 8 4	3 1 , 1 8 4
C A I R	2 1 , 6	1 5 , 1

A l l o c a t i o n	3 8 ( 2 0 1 0 )	4 6 ( 2 0 1 5 )
I P M  P r e d i c t e d	4 5 , 1 3 2	4 6 , 8 6 9
P r o p o s e d  C a p	1 4 , 2 9 5 ( 2 0 0 9 )	1 4 , 2 9 5 ( 2 0 0 9 )

<u>Mercury</u> <u>Annual</u> <u>1</u> <u>Emissions</u>	<u>Phase I</u> <u>(lb)</u>	<u>Phase II</u> <u>(lb)</u>
2002 Estimated	103	103
CAMR Allocation	138 (20 10)	53 (20 18)
IPM Predict	233	279

ed		
Proposed Cap	137 (20 09)	51 (20 13)

The fifth step the Department considered was an implementation schedule for the limits based upon an adequate and reasonable time to install the pollution control equipment. Proposed regulation 1146 sets forth two phases, with phase I, beginning in 2009 and ending in 2011, and more stringent phase II limits beginning on January 1, 2012. The Department selected these dates in order to meet deadlines in NAAQS and CAMR, and I agree that the implementation time period are reasonable based upon other EGUs' installation of comparable pollution control equipment.

The Department's experts recommend a minor modification to the start of the phase I date, which would change from January 1, 2009, to May, 2009. This change would allow the EGUs more time to comply, but would still have the limits in place prior to the start of the 2009 ozone season, which begins on May 1 of each year.

I recommend that AQM's proposed regulation, as set forth in Appendix B, be adopted as a final regulation. The January 1, 2009, deadline is reasonable, but it included a reasonable allowance of additional time to comply with NAAQS' deadlines. The Department's experts agree that a modest extension until May 1, 2009 will not be a substantive change and will allow Delaware to meet the federal deadlines. The NAAQS deadline is based upon an ozone attainment, and the federal ozone season begins on May 1 of each year. Consequently, the Department's experts, as a compromise, recommend a minor modification to extend the deadline until May 1, 2009. This change will allow the EGUs more time to comply, but the phase I limits still will be in place in time to reduce

ozone forming emission in time for the May 1, 2009, ozone season. I find that it is a reasonable extension. I further recommend the change because I agree that it is a minor, non-substantive change from the proposed regulation as published, and hence does not trigger any further opportunity for public comment under the Administrative Procedures Act. It does not result in a substantive delay or inability for Delaware to meet NAAQS' compliance deadlines, and May 1, 2009, coincides with the need to reduce ozone levels for the annual ozone season.

As to the timing of the installation of the pollution control equipment, the Department's experts determined that even if the EGUs began to comply with the effective date of the proposed regulation on December 11, 2006, that the deadlines of January 1, 2009, and January 1, 2012, provided the EGUs with sufficient amount of time to install the necessary pollution control equipment. The EGUs disagree with the Department's experts' opinion. I find that the Department's assessment of the amount of construction time is reasonable based upon actual construction periods by other EGUs that have installed comparable pollution control equipment.

I agree that the implementation schedule does not afford the EGUs any time to waste, particularly if they wait until a final regulation's effective date of December 11, 2006, to start to take steps towards compliance with the limits. I also find that is not the situation with the Delaware EGUs, who have been aware (or should have been aware) of the need to take prudent steps to plan for the installation of needed pollution control equipment in order to reduce emissions of NO<sub>x</sub>, SO<sub>2</sub> and mercury. Based upon the EGUs' active participation in the informal process since 2003, and the SAN process since 2005, the EGUs have known of the Department's position. Indeed, the EGUs received

the proposed regulation in July 2006. Thus, they have not waited until December 11, 2006, to begin to take the steps needed to comply. To do otherwise would be irresponsible management. Fortunately, the record shows that the EGUs have spent considerable time and effort in planning to comply with the limits. These EGUs have been working, together with the Department, towards a solution to reduce their air emissions of these harmful pollutants, including considering the various pollution control equipment available. Thus, their prudent management efforts should provide an adequate time cushion for them to comply, beyond the reasonable time period the Department's time period already provided.

The Department's experts also addressed the timing issues in the two phases, as discussed below in the TSD:

As stated in an earlier section above, the target annual emissions mass caps were established based on the emission control capabilities of selective catalytic reduction (SCR) for NO<sub>x</sub> control, flue gas desulfurization (FGD) for SO<sub>2</sub> control, and carbon injection for mercury control. These technologies have been demonstrated to be highly effective, can be retrofit to existing units, and are commercially available. However, it is also recognized that day-to-day variations can have significant impact on the ability to attain stringent emission rate limits during any given short duration time frame. Unit output levels, amount of load following, fuel quality variability, and the need to perform routine maintenance can have an effect on the achievable emission rates over a short duration. Short term emission rate limits must be established at levels to ensure short term environmental goals are met while recognizing that long term emission rate values may not be attainable at any given specific time. In recognition of the potential variability, the proposed multi-pollutant regulation includes short term emission rates that are protective of the short term NAAQS but are less stringent than that which would be equivalent to the long term mass cap. Specific rate limits are discussed in the appropriate sections below.

With regards to mercury emissions from the coal-fired units, the proposed multi-pollutant regulation provides short term emission rate flexibility in Phase I and Phase II by allowing a unit to meet a specified emission rate or a percentage reduction from baseline testing conducted on that

particular unit. This should help eliminate the problems that could occur due to variability in unit design and/or fuel source.

It is also recognized that during Phase I of the emissions reductions, units may experience some control equipment start-up problems and require additional time for testing and optimization. For this reason, the Phase I NO<sub>x</sub> and SO<sub>2</sub> short term emission rate provisions allow for emission rate averaging for the units at a single, multi-unit facility. (Averaging of mercury emissions is not permitted in either Phase I or Phase II of the proposed multi-pollutant regulation.) The NO<sub>x</sub> and SO<sub>2</sub> averaging provisions allow some compliance flexibility for individual units while ensuring that facility emissions do not exceed the expected maximums. The lack of such averaging provisions in Phase II reflects the application of all appropriate controls on each of the units (a stated goal of this rulemaking process), reflects the solution of any technology problems encountered immediately after installation, and reflects experience gained in the operation and optimization of the installed technologies.

The application of short term emission rate limits is also significant for the residual oil-fired units subject to the proposed regulation. Because of the relatively high cost of fuel for these units, they will typically operate more during peak electrical use times such as hot summer days when electrical demand and costs are elevated. Such days also tend to be those with the greatest air quality problems caused by pollutants covered by this proposed regulation. Without adequate controls on these units, their emissions will substantially increase the pollutants emitted and contribute to air quality problems and public health concerns.

TSD at 37-38.

The Department's experts were also concerned with the timing and designed proposed regulation to provide the EGUs with flexibility in the implementation of the pollution control equipment. This concern was discussed as follows:

The proposed multi-pollutant regulation establishes both short term emission rate limits and annual emission mass emission caps. The proposed multi-pollutant regulation's short term rates represent a phased in approach similar, but in a somewhat accelerated manner, to the phased approach for mass caps established under the federal CAIR and CAMR programs. The CAIR and CAMR programs do not establish any short term emissions rate limitations, only the long term annual mass caps. However, the CAIR and CAMR programs implement the annual caps using a phased in approach in a fashion similar to that utilized for the

proposed multi-pollutant regulation, and would require units to reduce their emission rates to reflect both the interim (Phase I) and final (Phase II) annual emissions caps (assuming equal or higher unit capacity factors).

The utilization of phased in short term emission rates was selected to begin achieving some significant emission reductions in a relatively short period of time while still allowing the facilities flexibility in meeting the overall reduction goals. Flexibility will be gained during Phase I through the proposed multi-pollutant regulation's adoption of higher overall emission rate limitations (relative to the Phase II rate limitations) and also permitting units at a common facility to average their emission rates to achieve compliance. The proposed regulation does not specify a compliance methodology, only emission rate limitations. This allows subject facilities the flexibility to establish a compliance method that best suits the facility, and could include over-compliance on a unit(s) and averaging, interim controls installation, fuel switching, changes in operating schedules, etc.

The proposed multi-pollutant regulation's Phase I emission reductions will provide a period of time of significant emissions reductions to support the state in attaining emissions reduction required for its 8-hr ozone Reasonable Further Progress Plan (2010 demonstration date), and also support attaining the 8-hr ozone and fine particulate NAAQS. Meeting these goals will help Delaware avoid sanctions and penalties associated with non-compliance with the Clean Air Act provisions. Additionally, the Phase I emissions reductions would be expected to provide health benefits associated with improved air quality, including reductions in premature deaths, hospital visits, asthma attacks, etc.

TSD at 44.

The Department's experts considered the estimated cost to comply, and this issue was contested by the EGUs. The Department submitted a well-reasoned analysis of the estimated cost, and cited numerous well respected sources in arriving at the conclusion that the EGUs can economically install pollution control equipment similar to the installations that have already occurred at comparable EGUs in other states. Also, the two oil-fired EGUs could switch to natural gas or non-residual fuel oil, which would reduce emissions and this also would remove them entirely from the proposed regulation's application.

I find that, even accepting the EGUs' estimated costs to comply with the proposed regulation's limits, the proposed regulation is justified based upon the significant environmental and public health benefits from either installing the pollution control equipment, or the even greater benefits from shutting down these older and large sources of harmful pollutants. The Department cannot require uneconomic units to continue to operate. The Department recognizes that business decisions will control the investment in pollution control equipment or the closure of the units. The Department; however, is responsible for the environment and public health, and I find the record supports the proposed regulation as a well-supported effort to allow the EGUs to operate in an economical manner, and reduce their release of harmful emissions.

The EGUs will have to spend considerable money to comply with the proposed regulation through the installation of pollution control equipment or changes to their operations. The cost to comply is measured against the less precise measurement of the cost to public health (healthcare, premature death, etc) and the environment (crop damage, etc). The Department's experts carefully considered the many benefits in the TSD, as set forth below:

A wide range of human health and welfare benefits are associated with reductions in NO<sub>x</sub>, SO<sub>2</sub>, and mercury emissions from power plants. The Department, in its technical and professional opinion, believes that this regulation will be instrumental in achieving attainment with national ambient air quality standards of ozone and particulate matter, and reducing mercury emissions in the state of Delaware, which will result in benefits to the state of Delaware, including the following:

- Reduction in the incidence of premature mortality.
- Reduction in the incidence of non-fatal myocardial infarction.
- Reduction in the incidence of chronic bronchitis.
- Reduction in the incidence of hospital admissions for respiratory and cardiovascular problems.
- Reduction in the incidence of emergency room visit for asthma.

- Reduction in the incidence of respiratory symptoms.
- Reduction in the incidence of lost work days.
- Reduction in the incidence of school absences.
- Reduction in IQ loss (neurobehavioral incidence reduction) in fish-consuming population.
- Improvement in visibility
- Improvement in yield for agronomic crops.
- Reduction of injury to forest trees, foliage, and ornamental plants
- Reduction in impact on the health and stability of ecosystems.

In its CAIR analysis, US EPA grouped New Jersey and Delaware together for analysis purposes. The US EPA estimated that approximately \$630 million of the total annual CAIR program benefit could be attributable to annual SO<sub>2</sub> and NO<sub>x</sub> controls for New Jersey and Delaware in Phase I of the CAIR program, and approximately \$1.1 billion of the total annual benefit could be attributed to annual SO<sub>2</sub> and NO<sub>x</sub> controls for New Jersey and Delaware in Phase II of the CAIR program. The US EPA based estimated CAIR benefits on population, and indicated that CAIR benefits in a state could be estimated based on the population of that state. The US Census Bureau's estimated 2005 population for Delaware is approximately 9% of the combined New Jersey/Delaware population. It is estimated that Delaware would realize an approximate \$57 million annual benefit in Phase I of CAIR and an approximate \$99 million annual benefit in Phase II of CAIR.

Since the proposed multi-pollutant regulation's annual SO<sub>2</sub> mass emissions cap is similar to (less than 6% lower) the CAIR Phase II cap for the affected units, and the proposed regulation's annual NO<sub>x</sub> cap is higher than the CAIR Phase II cap (effectively establishing the CAIR program as the controlling factor), it is estimated that the annual benefit from the proposed multi-pollutant regulation would be similar to that estimated for Phase II of CAIR. However, other states may not be implementing their emissions reductions at the same pace set in Delaware, resulting in pollutants transported into Delaware being between CAIR Phase I and CAIR Phase II levels until the regulatory start of the CAIR Phase II. Therefore, it would be expected that Delaware would realize an annual benefit between the estimated Phase I \$57 million and the estimated Phase II \$99 million during the CAIR Phase I period. After the regulatory start of the CAIR Phase II, it would be expected that Delaware would realize the Phase II annual benefit estimated at \$99 million.

The NO<sub>x</sub> reductions anticipated to result from implementation of the proposed regulation are expected to assist Delaware in obtaining the required emissions reductions necessary to meet Delaware's Clean Air Act obligations for Reasonable Further Progress for the 8-hour ozone standard.

An additional benefit of the proposed regulation is that the emissions reductions required in the regulation will help Delaware achieve attainment of the ground level ozone and fine particulate national ambient air quality standards (NAAQS). This may be of significant economic benefit to Delaware as it would make Delaware more attractive to businesses considering moving into Delaware. This is because for areas classified as non-attainment, any new emissions source of the non-attainment pollutant would be required to offset their emissions so that the new source does not add to the non-attainment problem. Along with this is the stigma that for non-attainment counties, the air is not healthy to breathe for the employees of any company considering location in those Delaware counties.

The EPA estimated that the CAMR would result in an approximate 3% to 4% reduction in fish tissue mercury concentration alone, and when combined with the PM reduction effects of CAIR, the total fish tissue mercury concentration was estimated to be reduced by approximately 19% to approximately 22%. The EPA also estimated an approximate \$11,000 annual benefit with CAIR and CAMR due to avoided lost earnings associated with IQ loss due to mercury exposure. As the proposed multi-pollutant regulation closely follows the mercury emission caps associated with CAMR, it is estimated that the proposed regulation will result in similar benefits.

Because mercury has been shown to be a bioaccumulative toxic metal, and recent studies have demonstrated that local controls of mercury emissions lead to reduced levels of mercury concentration in local ecosystems, it is appropriate to apply controls to large mercury emitting sources. However, the Department was not able to obtain sources of information that quantify the economic impact of mercury emissions reductions on neurological effects, cardiovascular effects, genotoxic effects, immunotoxic effects, or ecological effects. Therefore, while it is evident that economic benefits will accrue, for the purpose of quantifying economic benefits, no benefits were estimated for mercury reduction.

In the CAIR analysis, the US EPA indicated that the combined New Jersey and Delaware emissions contributed to PM<sub>2.5</sub> non-attainment in downwind areas in 13 states and the District of Columbia. Emissions reductions occurring in Delaware would reduce Delaware's contribution to PM<sub>2.5</sub> non-attainment in those areas.

TSD at 57-58.

The estimating of public and social benefits is admittedly not precise. For example, the law measures loss of life or diminished quality of life by jury awards, which

reflect subjective evaluations. The record reflects that the cost of air pollution include health care cost, and a EPA study reported that for each dollar of pollution control equipment invested produced ongoing annual health care savings of \$10.

This proposed regulation will significantly reduce harmful emissions, and these emissions harm the environment and human health, particularly the most vulnerable, namely, children, pregnant women, the elderly, and those who suffer from lung disease or impaired ability to breathe. The public hearing record includes many comments on this impact in Delaware, and by those who reside near the three locations where the EGUs emit their harmful pollutants. These locations are near residential areas and schools, and the impact of reduced emissions will benefit the local residents more. Clearly, these persons will not benefit at all if the EGUs continue to purchase a clean air allowance.

I find that the Department's proposed regulation is reasonable and well-supported. The cost of compliance and cost of benefits are projections into the future and there can be no perfect determination now, only a reasonable one. For example, the true cost of the pollution control equipment's installation will only be known after it is installed. I find that the Department, as the proponent of the proposed regulation, has shown through considerable technical expertise and judgment, based on well-accepted sources, that the proposed regulation is appropriate to protect Delaware's environment and public health.

The Department's experts recognize that projections of the future cannot be perfect. Accordingly, in response to public comments from the EGUs, they recommend a new section 8.3, which they consider a minor modification and non-substantive change. My review indicates that this provision allows for an extension procedure for meeting the

proposed regulation's deadline for SO<sub>2</sub> controls. The maximum extension is one year, and the procedure imposes a considerable burden of proof on an applicant.

I find that the recommended modification is procedural and not change the substantive portions of the proposed regulation. It reflects the Department's existing discretion to exercise its statutory authority to provide short-term relief from regulations. The Department may also re-open the regulation to an amendment on its own, or upon petition. The Administrative Procedures Act provides ways to seek relief from regulations, as does the Department's authority to grant variances. I find that the proposed Section 8.3 reflects an attempt to codify existing procedures already available to the EGUs. Consequently, I find that it is non-substantive in nature, but procedural. As such, it is exempt from the APA's notice and public hearing requirements. The Department may also indirectly grant a one year extension by not exercising its discretionary authority to enforce its regulations for an EGUs failure to meet the deadline.

The proposed regulation also will address many of the environmental organizations' concerns with the direct regulation of PM. The Department plans to address this pollutant in the future in a separate regulatory proceeding. Proposed regulation will result in a reduction in PM emissions as a side benefit from the pollution control equipment that the EGUs should install to comply with proposed regulation 1146's limits. Most environmental groups and most individual comments supported the Department's effort to reduce the emission of harmful pollutants through proposed regulation 1146.

The Department may want to consider a mid-term review of the proposed regulation, if approved. This review may allow an assessment of any changes to consider

at that time based upon new information or changed circumstances. This type of procedure does not have to be in the regulation, but I recommend that the Secretary consider ordering such a process if he adopts the proposed regulation.

In sum, I find that the Department provided ample, well-documented technical support for proposed regulation 1146 in the record, and that there is a sound and reasonable basis for the exercise of the Department's state authority to issue a final regulation that will protect Delaware's environment and public health and welfare.

#### **IV. RECOMMENDED FINDINGS AND CONCLUSIONS**

Based on the record developed, I find and conclude that the record supports approval of the proposed regulation, as set forth in Appendix B hereto, as final regulations. Based on the record developed, I also find and conclude that the record supports approval of the proposed CAA Section 111(d) plan, as set forth in Appendix C hereto, as a final planning document. In conclusion, I recommend the Secretary adopt the following findings and conclusions:

- 1.) The Department has jurisdiction under its statutory authority to make a determination in this proceeding;
- 2.) The Department provided adequate public notice of the proceeding and the public hearing in a manner required by the law and regulations;
- 3.) The Department held a public hearing on the proposed regulation and plan in a manner required by the law and regulations;
- 4.) The Department considered all timely and relevant public comments in making its determination on the proposed regulation and plan;

5.) The Department's final regulation, as published in the September 1, 2006, *Delaware Register of Regulations*, and as modified in minor and non-substantive changes as set forth in Appendix B hereto, and the Clean Air Act Section 111(d) Plan are adequately supported, have a reasonable basis and purpose, and are consistent with the Department's purposes and applicable laws and regulations. Consequently, the proposed regulation 1146 in Appendix B should be approved as final regulation and the proposed plan should be approved as a final plan, and they should be allowed to go into effect ten days after publication in the next available issue of the *Delaware Register of Regulations*; and that

6.) The Department shall submit the approved final regulation 1146 and the final plan to the *Delaware Register of Regulations* for publication in its next available issue, and shall provide written notice to the persons affected by the Order.

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Robert P. Haynes, Esquire  
Senior Hearing Officer