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BEFORE
THE PUBLIC UTILITIES COMMISSION OF OHIO

PUCO

In the Matter of the Application of Duke)
Energy Ohio to Adjust and Set the) Case No. 10-1268-EL-RDR
Annually Adjusted Component of its)
Market Based Standard Service Offer.)

PREPARED TESTIMONY
OF
DAVID W. MARCZELY
DWM Environmental, Inc.

On Behalf of
The Office of the Ohio Consumers' Counsel
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November 21, 2010

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EXHIBITS AND ATTACHMENTS

DWM EXHIBIT 1	2008 CONSENT DECREE
DWM EXHIBIT 2	2009 MN&O
DWM EXHIBIT 3	MARCZELY RESUME

1 **I. INTRODUCTION**

2

3 **Q1. PLEASE STATE YOUR NAME, ADDRESS AND POSITION.**

4 **A1.** My name is David W. Marczely. I am self-employed and president of DWM
5 Environmental, Inc, 9873 Tamarack Trail, Brecksville, OH 44141.

6

7 **Q2. WHAT IS YOUR EDUCATIONAL EXPERIENCE?**

8 **A2.** I have a B.S. in physics from Drexel University (1966), a Ph.D. in Meteorology
9 from Penn State University (1973) and a J.D. from Cleveland-Marshall College of
10 Law (1991).

11

12 **Q3. WHAT IS YOUR WORK EXPERIENCE?**

13 **A3.** I was a Professor of Earth Science at Southern Connecticut State University from
14 1970 through 1988. I was employed by the Floyd Browne Group (formerly
15 Environmental Mitigation Group and Environmental Design Group) from May,
16 1991 to June, 2007, when I left to form my own environmental consulting
17 company. I am also an Adjunct Professor of Law at Cleveland Marshall College
18 of Law, since 1992, where I teach Environmental Law. I am a licensed Ohio
19 Attorney since 1991, although I do not generally practice law. I was formally an
20 arbitrator for the Akron Better Business Bureau. I work mainly in air compliance
21 and permitting, although I sometimes conduct comprehensive environmental
22 audits and risk assessment for remediation projects. Pertinent to this testimony, I
23 am a consultant for the Kent State University Power Plant and prepared the permit

1 applications for the installation of the natural gas turbines. Also in the early
2 nineteen-nineties, I prepared the monitoring plan for a demonstration project at
3 the then Ohio Edison Berger plant that demonstrated the effectiveness of a
4 combination filter bag house for control of particulate matter, sulfur dioxide and
5 nitrogen oxides. My Resume is attached as DWM Exhibit 3.

6
7 ***Q4. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY IN UTILITY CASES***
8 ***BEFORE THE PUBLIC UTILITIES COMMISSION OF OHIO (PUCO)?***

9 ***A4.*** Yes, in Case No. 07-63-EL-UNC.

10
11 ***Q5. WHAT DOCUMENTS HAVE YOU REVIEWED IN THE PREPARATION OF***
12 ***YOUR TESTIMONY?***

13 ***A5.*** From the current case I have reviewed the Application filed by the Duke Energy
14 Ohio, Inc. ("Duke") and the testimony filed by Peggy A. Laub on behalf of Duke.

15
16 I have reviewed Duke's responses to discovery requests from the Ohio
17 Consumers' Counsel ("OCC"). I have reviewed the December 17, 2008 Opinion
18 and Order ("Opinion and Order") of the Public Utilities Commission of Ohio
19 ("PUCO" or the "Commission") in Case No. 08-920-EL-SSO, on which Duke
20 bases its application in the current case. In addition, I have reviewed the Consent
21 Decree entered on August 7, 2008 in the United States District Court for the

1 Southern District of Ohio, Eastern Division¹ ("2008 Consent Decree") and the
2 Memorandum Opinion & Order entered on May 29, 2009 in the United States
3 District Court for the Southern District of Indiana, Indianapolis Division² ("2009
4 MO&O").

5
6 I have reviewed Duke's reply comments and the affidavit by Peggy Laub attached
7 to them, and the Stipulation and Recommendation from PUCO Case No. 08-920-
8 EL-SSO, based on which Duke has made legal objection to OCC's Interrogatories
9 relative to the relevance of Emission Allowances in this case.³

10
11 ***Q6. WHAT IS THE PURPOSE OF YOUR TESTIMONY IN THIS***
12 ***PROCEEDING?***

13 ***A6.*** The purpose of my testimony is to critique the Duke testimony, documents and
14 responses to discovery in this case in order to evaluate Duke's request for
15 recovery of environmental compliance costs associated with its Annually
16 Adjusted Component ("AAC") of its Market Based Standard Service Offer.

17
18 ***Q7. WHAT ARE YOUR RECOMMENDATIONS IN THIS PROCEEDING?***

19 ***A7.*** I am recommending that the Commission reduce, as unjust enrichment, Duke's
20 request for recovery, amounts equal in value to the loss of marketable emission

¹ *Sierra Club and The Dayton Power and Light Company, et al*, Civil Action No. 2:04-cv-905 (DWM Exhibit 1, "2008 Consent Decree").

² *United States of America and Cinergy Corporation, et al*, Case No. 1:99-cv-01693-LJM-JMS (DWM Exhibit 2, "2009 MM&O").

³ Duke's reply to OCC-INT-03-029, -30, -032, -038, -043 and -044.

allowances that Duke surrendered in the 2008 Consent Decree and in the 2009 MO&O, and that Duke pays for in environmental compliance costs contained in Duke's request for recovery in this case.

Q8. WHAT ARE EMISSION ALLOWANCES?

A8. Emission allowances are limits on the maximum emission of sulfur dioxide ("SO₂") under Title IV of the Clean Air Act ("Title IV") or of SO₂ and nitrogen dioxide ("NO_x") under the Clean Air Interstate Rule ("CAIR").⁴ These laws award these emission allowances based on historical records of individual power plant units, with a periodic reduction, to the companies that own the plants. They are fungible. A company's total emissions for each pollutant may not exceed the company's inventory of emission allowances for the year. Therefore, individual power units need not have sufficient emission allowances for its emissions, as long allowances and emissions balance for the company. They are marketable. If a company has more annual emissions than allowances, it can purchase emission allowances from companies that have more allowances than emissions, and vice versa.

⁴ Currently, EPA mandates "CAIR" while under court mandate to change the rule.

**Q9. WHAT IS YOUR UNDERSTANDING OF THE AAC PROVISION THAT
ALLOWS DUKE TO RECOVER COSTS ASSOCIATED WITH
SURRENDERED EMISSION ALLOWANCES?**

A9. In its Opinion an Order in the 2008 ESP case (08-920-EL-SSO), the Commission allowed Duke to recover certain annual costs associated with environmental compliance, as well as those costs associated with changes in taxes and costs for Homeland Security. The term "environmental compliance" is not defined in the Opinion and Order, although the Commission does quote on page 7 the applicable law, Section 4928.02 of the Revised Code. None of the applicable law cited in the Opinion and Order would justify judicial or administrative penalties as recoverable costs of environmental compliance.

Generally, the costs of reducing emission of pollutants to satisfy an emission allowance inventory⁵ that is provided as part of an environmental regulatory scheme, such as Title IV and CAIR, are legitimate costs for recovery. However, when that emission allowance inventory is reduced because of an order to surrender emission allowances for alleged or proved violations of law, the added costs of reducing emissions to satisfy that reduced inventory are not recoverable environmental costs, but are penalty costs for which the Commission should not allow recovery. The term "penalty" is used here in the broad sense, that is, to include legal penalties, but also to include the surrender of emission allowances as

⁵ Emission Allowance "Inventory" is used here to refer the total number of Emission Allowances in a company's portfolio that it can freely transfer among its power plants.

1 an equitable remedy for irreparable harm⁶ to the environment as in the 2009
2 MM&O and as settlement to end a citizen suit for alleged violations of the Clean
3 Air Act as in the 2008 Consent Decree. The surrender of emission allowances in
4 the 2009 MM&O and in the 2008 Consent Decree are not the result of generally
5 applicable emission allowance laws like Title IV or CAIR, to whose costs
6 customers should expect to contribute.

7
8 **II. SURRENDERED EMISSION ALLOWANCES IN THIS CASE**

9
10 ***Q10. WHAT EMISSION ALLOWANCES WERE SURRENDERED IN THE 2008***
11 ***CONSENT DECREE?***

12 ***A10.*** The 2008 Consent Decree required the then current owners of the Stuart plant to
13 surrender to a third-party corporation a total of 5,500 marketable SO₂ Emission
14 Allowances, with vintage years between 2010 and 2016.⁷ According to the 2008
15 Consent Decree, Duke's share is 39%.⁸ The approximate costs for SO₂ emission
16 allowances for the year ending March 31, 2010 was \$80.⁹ The surrendered
17 emissions allowances are approximately worth for \$171,600 for the current
18 recovery period. The loss of emission allowances amounts to a monetary penalty
19 because Duke must either purchase allowances, increase the level of emission
20 control to reduce its emissions down to the new allowance level or forgo selling

⁶ 2009 MM&O, p. 35.

⁷ 2008 Consent Decree, p. 14.

⁸ 2008 Consent Decree, p. 14.

⁹ Federal Energy Regulatory Commission, Market Oversight, www.ferc.gov/oversight.

1 surplus emission control on the open market. There is simply no monetary
2 difference between a reduction in emission allowance and a penalty or a fine for
3 environmental noncompliance, except the Duke has the ability to choose the
4 method of payment. Customers should not be required to pay for this penalty
5 because Duke's decision to avoid compliance standards in 2000 was a business
6 decision for which shareholders should maintain a risk.

7
8 **Q11. WHAT EMISSION ALLOWANCES WERE SURRENDERED IN THE 2009**
9 **MM&O?**

10 **A11.** The jury in *United States of America and Cinergy Corporation, et al* found that
11 Cinergy (now Duke) violated the Clean Air Act when it failed to obtain a NSR
12 permit for four projects at the Wabash River units 2, 3 and 5 from 1989 through
13 1990.¹⁰ Had Cinergy obtained NSR permits, it would have installed BACT-level
14 technology for control of SO₂, NO_x and very fine particulate matter ("PM_{2.5}")
15 that would have prevented significant and irreparable harm to the environment.¹¹
16 The court noted that 28 U.S.C. § 2462 barred civil penalties for these past
17 violations, but that equitable remedies were allowed.¹² The court ordered the
18 shutdown of the Wabash River units 2, 3 and 5 by September 30, 2009. In
19 addition, the court ordered an additional remedy for irreparable injury in the form
20 of the permanent surrender of SO₂ emission allowances, equivalent to the excess

¹⁰ 2009 MM&O, p. 4, See Footnote 2

¹¹ Ibid, p. 33.

¹² Ibid, p. 32.

1 emissions from these three units from the date of the projects to the present.¹³
2 The court determined that the measure of the permanently surrendered SO2
3 Emission Allowances would be approximately equal to the amount of SO2
4 emissions from the Wabash River units 2, 3 and 5 from the period beginning on
5 May 22, 2008 through shut down of those units.¹⁴ Note that the court did not
6 order the surrender of the emission allowances for the Wabash River units
7 themselves. That would have been meaningless since the court ordered the units
8 be shut down. Instead, the court ordered the three defendants to surrender
9 emission allowance in amounts measured by the Wabash River's emission record.
10 Because the surrender of the SO2 Emission Allowance is permanent, Duke, as a
11 successor company to the defendants, must operate annually with fewer SO2
12 Emission Allowances by an amount equal to Duke's share of the court-ordered
13 surrender.

¹³ Ibid, p. 35.

¹⁴ Ibid, p. 55.

**III. COSTS ASSOCIATED WITH SURRENDERED EMISSION
ALLOWANCES**

***Q12. HAS DUKE IDENTIFIED COSTS THAT ARE ASSOCIATED WITH THE
SURRENDER OF THE EMISSION ALLOWANCES?***

A12. Duke objected to answering OCC Interrogatories relative to the extent of those surrendered Emission Allowances.¹⁵ In its Reply Comments of November 12, 2010, Duke states “that there is no request for ANY cost recovery associated with the surrendering of any emission allowances in the Company’s application in this case.” The Affidavit by Peggy Laub states that “This application includes no costs associated with emission allowances...” The veracity of these statements depends on what Duke means by “associated.” There are no direct costs identified, as such, as costs for emission allowances. Consequently, an explanation of the costs associated with the surrender of the emission allowances is warranted and follows.

***Q13. HOW CAN THE SURRENDER OF THE EMISSION ALLOWANCES
AFFECT ENVIRONMENTAL CONTROL COSTS?***

A13. Emission allowances are limits on the maximum emission of sulfur dioxide (“SO₂”) under Title IV of the Clean Air Act or of SO₂ and nitrogen dioxide (“NO_x”) under the Clean Air Interstate Rule¹⁶. A power plant may emit no more

¹⁵ Duke’s reply to OCC-INT-03-029 through -044.

¹⁶ Currently, EPA mandates “CAIR” while under court mandate to change the rule.

1 than its emission allowances, but emission allowances are fungible. They can be
2 bought and sold. They can be transferred easily within a company. Emission
3 control that can reduce the plant's SO₂ and NO_x emission below its emission
4 allowances can be transferred freely to another plant in the company that has
5 larger amount of emissions than it has emission allowances. Therefore, a
6 company's emission allowance inventory determines the company's total needs
7 for emission control. The emission control and its costs can be at any plant. At
8 the end of the year, the total emission allowance in the company's inventory must
9 balance with the total emissions throughout the company, with the difference
10 made up by purchase or sale of emission allowances on the open market.

11
12 Although we do not know for sure because of Duke's objections to respond to
13 OCC Interrogatories on the subject, it is reasonable to assume that currently Duke
14 may be operating its power plants with a company-wide emission allowance
15 inventory that is lower than the emission allowance inventory awarded through
16 environmental regulations by the amount equal to the surrendered emission
17 allowances. Alternatively, Duke may have purchased emission allowances on the
18 open market to make up for the surrender, or it may have received emission
19 allowances from a related company who has excess allowances.

20
21 If Duke has a reduced emission allowance inventory and has not made up the
22 difference by purchase or transfer emission allowance, then Duke is required to
23 reduce emissions by enhancing its emission controls, switching fuels or forgoing

1 the power production that produces emissions. The additional environmental
2 control costs are not spent for compliance with the emission allowances required
3 by environmental regulation, but as compensation for the surrendered emission
4 allowances. Even a fuel switch as a means to meet the lower emission allowance
5 inventory generates additional costs in the increased costs of fuels and in the
6 increased environmental control at the alternate combustion source.

7 Alternatively, Duke will incur additional costs to buy emission allowance.

8
9 ***Q14. CAN THE SURRENDER OF THE EMISSION ALLOWANCES RESULT IN***
10 ***ENVIRONMENTAL CONTROL COSTS EVEN IF THE EMISSION***
11 ***ALLOWANCE INVENTORY HAS NOT CHANGED AS A RESULT OF THE***
12 ***SURRENDER?***

13 ***A14.*** Duke's objection to answering OCC Interrogatories relative to emission
14 allowances forces me to speculate. The following is only an example, designed to
15 demonstrate that costs associated with emission allowances are varied and
16 complicated. Since Duke has the burden of proof at hearing, it can have its
17 opportunity to prove that its customers are not being asked to pay for the costs
18 associated with the surrender of emission allowance as ordered by the Court.

19
20 Emission allowances are fungible and the 2008 Consent Decree and the 2009
21 MM&O involved multiple defendants and issues, plus subsequent mergers
22 resulting in allied companies under common ownership. The division of the
23 surrendered emission allowances to each company's emission allowance

1 inventory could reasonably be determined through contract provisions, such as the
2 promise to transfer excess emission allowances. The costs of reducing emissions
3 to generate excess emission allowances in order to satisfy that contract would be
4 costs that help pay a penalty.

5

6 ***Q15. DO INDIVIDUAL PROJECTS NEED TO BE IDENTIFIED TO***
7 ***DETERMINE THE COSTS ASSOCIATED WITH THE SURRENDER OF***
8 ***EMISSION ALLOWANCES?***

9 ***A15.*** No. Since emission allowances are fungible, the costs of the surrendered
10 emission allowance are simply the reduction of Duke's emission allowance
11 inventory, after any legitimate purchase of emission allowances.

12

13 ***Q16. WHAT WOULD YOU ASK OF THE COMMISSION IN THIS CASE?***

14 ***A16.*** I would request that the Commission determine that Duke has not met its burden
15 of proof that the costs of environmental compliance that it claims for recovery are
16 prudent. Duke has claimed for recovery environmental compliance costs that were
17 spent for reduction of pollution that were necessary because of the surrender of
18 emission allowances in the 2008 Consent Decree and the 2009 MM&O, in
19 addition to the pollution control costs that were necessary to meet the emission
20 allowance inventory based on the generally applicable Title IV and CAIR
21 regulations.

22

1 The measure of these additional costs of pollution control should be the costs of
2 the surrendered emission allowances Duke would have purchased if it did not
3 spend the costs for pollution control. In my answer to Question 10, I
4 demonstrated that Duke's share of the surrendered emission allowances in the
5 2008 Consent Decree was approximately \$171,600. Because Duke has objected
6 to OCC's Interrogatories relative to emission allowance, I cannot determine
7 Duke's share of the surrendered emission allowances for the 2009 MM&O. Until
8 Duke can provide this value, the Commission should rule that it has not yet met
9 its burden of proof that all of its requests for recovery of environmental
10 compliance costs are prudent.

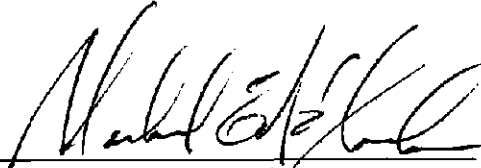
11

12 **Q17. DOES THIS CONCLUDE YOUR TESTIMONY?**

13 **A17.** Yes. It does. However, I reserve the right to incorporate new information that
14 may subsequently become available. I also reserve the right to supplement my
15 testimony in response to positions taken by the PUCO Staff.

CERTIFICATE OF SERVICE

I hereby certify that a true copy of this Testimony of David W. Marczely was served by first-class U.S. Mail to the parties of record identified below, on this 22nd day of November, 2010.



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UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF OHIO

Eastern Division

SIERRA CLUB and)

MARILYN WALL,)

Plaintiffs,)

v.)

Civil Action No.: 2: 04-cv-905

Judge Sargus

Magistrate Judge Abel

THE DAYTON POWER AND LIGHT)

COMPANY,)

DUKE ENERGY OHIO, INC., and)

COLUMBUS SOUTHERN POWER CO.,)

Defendants.)

CONSENT DECREE

WHEREAS, the Sierra Club and Marilyn Wall (collectively "Plaintiffs") served notice of intent to sue letters ("Notice Letters") dated July 21, 2004, and July 31, 2006, and filed a Complaint on September 21, 2004, and a First Amended Complaint on October 13, 2006 (collectively, "Complaints") against The Dayton Power and Light Company ("DP&L"), Duke Energy Ohio, Inc. ("DEO") and Columbus Southern Power Company ("CSP") (collectively "Owners") (all collectively referred to as "Parties") pursuant to Section 7604(a) of the Clean Air Act (the "Act") and 28 U.S.C. § 1331 for injunctive and declaratory relief and civil penalties and beneficial mitigation projects for alleged violations at the J.M. Stuart Station ("Stuart Station") located in Aberdeen, Ohio of:

- (a) the Prevention of Significant Deterioration provisions in Part C of Subchapter I of the Act, 42 U.S.C. §§ 7470-79;
- (b) the New Source Performance Standards ("NSPS"), 42 U.S.C. § 7411;
- (c) Title V of the Act, 42 U.S.C. § 7661 *et seq.*, and the Title V permit issued by the State of Ohio for Stuart Station; and
- (d) the federally-enforceable State Implementation Plan ("SIP") for the State of Ohio;

WHEREAS, Stuart Station is owned jointly by DP&L, DEO and CSP and is operated by DP&L;

WHEREAS, in their Complaint, Plaintiffs allege, *inter alia*, that Owners failed to obtain the necessary permits and comply with emission limits required by the Act for sulfur dioxide ("SO₂"), nitrogen oxides ("NO_x"), and/or particulate matter ("PM") emissions from Stuart Station, and that Owners violated various operating permit conditions at Stuart Station;

WHEREAS, Owners have denied and continue to deny the violations alleged in the Complaint; maintain that they have been and remain in compliance with the Act and the Ohio SIP and are not liable for civil penalties or injunctive relief; and consent to the obligations imposed by this Consent Decree solely to avoid the costs and uncertainties of litigation;

WHEREAS, prior to the initiation of this lawsuit, Owners had installed low NOx burners and selective catalytic reduction systems ("SCRs") to achieve significant reductions in NOx emissions and had entered into a contract for the installation of flue gas desulfurization systems ("FGDs") that can achieve significant reductions in SO₂ and PM emissions;

WHEREAS, prior to and during this case, Owners operated their low NOx burners continuously and operated their SCRs only during the ozone season each year and Owners advanced their schedule for the installation of the FGDs;

WHEREAS, the Parties have negotiated in good faith and have reached a settlement of the issues raised in the Notice Letters and the Complaints;

WHEREAS, the Parties have consented to entry of this Consent Decree without trial of any issue, and without any adjudication or determination of liability;

and

WHEREAS, the Parties agree, and the Court by entering this Consent Decree finds, that this Consent Decree is fair, reasonable, and in the public interest; and that entry of this Consent Decree without further litigation is the most appropriate means of resolving this matter;

NOW, THEREFORE, without any admission of fact or law, and without any admission of the violations alleged in the Complaints, Notice Letters and otherwise; it is hereby ORDERED, ADJUDGED, AND AGREED as follows:

I. JURISDICTION AND VENUE

1. This Court has jurisdiction over this action, the subject matter herein, and the Parties consenting hereto, pursuant to 28 U.S.C. § 1331 and Section 7604(a) of the Act. Venue is proper in the Southern District of Ohio under Section 7604(c)(1) of the Act, and 28 U.S.C. § 1391(b), because Stuart Station is located in this district.

II. APPLICABILITY

2. Upon entry, the provisions of this Consent Decree shall apply to and be binding upon the Parties, their successors and assigns.

III. DEFINITIONS

3. "Boiler Operating Day" means, for each Stuart Station Unit, a calendar day during which Fossil Fuel is combusted at that Stuart Station Unit for at least eighteen (18) hours within such calendar day.

4. "CEMS" or "Continuous Emission Monitoring System" means, for obligations involving NO_x and SO₂ under this Consent Decree, the devices defined in 40 C.F.R. § 60.2 and installed and maintained as required by 40 C.F.R. Part 60.

5. "Clean Air Act" or "Act" means the federal Clean Air Act, 42 U.S.C. §§ 7401- 7671q.

6. "Consent Decree" or "Decree" means this Consent Decree.

7. "Demand Side Management" or "DSM" means any and all end-user demand and energy efficiency and reduction programs and investments, including investments in smart metering and associated communications equipment, computerized software and billing systems necessary to implement DSM programs, but not including distribution transformers and similar investments.

8. "Effective Date" means the date that this Consent Decree is entered by the Court.

9. "Emission Rate" means the number of pounds of pollutant emitted per million British thermal units of heat input ("lb/mmBTU"), measured in accordance with this Consent Decree.

10. "ESP" means electrostatic precipitator, a pollution control device for the reduction of PM.

11. "Filterable" particulate matter emissions are the particles that are trapped by the glass filter in the front half of a sampling train, as measured through U.S. EPA Method 5 or Method 5B.

12. "Flue Gas Desulfurization System," or "FGD," means a pollution control device that employs flue gas desulfurization technology for the reduction of sulfur dioxide.

13. "Fossil Fuel" means any hydrocarbon fuel, including coal, petroleum coke, petroleum oil, or natural gas.

14. "Generation Emergency" means the period of time starting when PJM issues a real-time "Primary Reserve Warning," or when PJM requires "Maximum Emergency Generation," whichever is earlier, for the Control Zone which includes Stuart Station and ending twelve (12) hours after PJM cancels the Primary Reserve Warning or Maximum Emergency Generation. "Control Zone," "Primary Reserve Warning" and "Maximum Emergency Generation" shall be defined as set forth in the PJM Emergency Procedures Manual.

15. "Hourly Heat Input" means the hourly heat input (expressed in mmBTU/hr) as measured by CEMS.

16. "lb/mmBTU" means pound(s) of a pollutant per million British thermal units of heat input.

17. "Malfunction" means malfunction as that term is defined under 40 C.F.R. § 60.2.

18. "MW" means a megawatt or one million watts.

19. "National Ambient Air Quality Standards" or "NAAQS" means national ambient air quality standards that are promulgated pursuant to Section 109 of the Act, 42 U.S.C. § 7409.

20. "Net Emissions Increase" shall have the same meaning as in 40 C.F.R. § 52.21(b)(3), as in effect as of the date of lodging of this Consent Decree.

21. "Nonattainment New Source Review" or "Nonattainment NSR" means the nonattainment area New Source Review program under Part D of Subchapter I of the Act, 42 U.S.C. §§ 7501-7515, 40 C.F.R. Part 51.

22. "NO_x" means oxides of nitrogen.

23. "NO_x Allowance" means an authorization to emit a specified amount of NO_x that is allocated or issued under the NO_x SIP Call or any subsequent emissions trading program that replaces the NO_x SIP Call that is applicable to Stuart Station.

24. "NSPS" means New Source Performance Standards within the meaning of Part A of Subchapter I, of the Clean Air Act, 42 U.S.C. § 7411, 40 C.F.R. Part 60.

25. "Owners" means DP&L, DEO and CSP.

26. "Ownership Interest" means DP&L's, DEO's or CSP's legal or equitable interest in Stuart Station as of the date of lodging of this Consent Decree.

27. "Parties" means Plaintiffs and Owners.

28. "PJM Interconnection, LLC" or "PJM" means PJM Interconnection, LLC or a successor or replacement to PJM, including another regional transmission organization or independent system operator to which Stuart Station may become subject.

29. "Plaintiffs" means Sierra Club and Marilyn Wall.

30. "PM" means particulate matter.

31. "PSD" means Prevention of Significant Deterioration within the meaning of Part C of Subchapter I of the Clean Air Act, 42 U.S.C. §§ 7470 - 7479 and OAC 3745-31.

32. "Renewable Energy" means wind power; solar power; new or increased hydroelectric power from existing dams or locks; cooling towers or other water flows through a power plant; biomass, not including landfill gas or municipal solid waste; fuel cells not powered by Fossil Fuels; and combined heat and power projects from an existing source of heat.

33. "Rigid Type Electrodes" means a type of discharge electrode used in an ESP that consists of a central mast with pins attached used in corona generation.

34. "Selective Catalytic Reduction System" or "SCR" means a pollution control device that employs selective catalytic reduction technology for the reduction of NO_x emissions.

35. "SO₂" means sulfur dioxide.

36. "SO₂ Allowance" means "allowance" as defined at 42 U.S.C. § 7651a(3): "an authorization, allocated to an affected unit by the Administrator of EPA under Subchapter IV of the Act, to emit, during or after a specified calendar year, one ton of sulfur dioxide."

37. "Stuart Station" means, for purposes of this Consent Decree, the four pulverized coal-fired units located at J.M. Stuart Station, located in Aberdeen, Ohio.

38. "Stuart Station Unit" means any one of the four pulverized coal-fired units located at Stuart Station.

39. "Third Party Purchaser" means an entity that is not a subsidiary or an affiliate of an Owner.

40. "30-Day Rolling Average NO_x Emission Rate" for Stuart Station shall be expressed as lb/mmBTU and calculated in accordance with the following procedure: first, sum the total pounds of NO_x emitted from each Stuart Station Unit during a Boiler Operating Day and the previous twenty-nine (29) Boiler Operating Days for each Stuart Station Unit to determine total Stuart Station 30-day pounds of NO_x; second, sum the Hourly Heat Input to each Stuart Station Unit in mmBTU during the Boiler Operating Day and the previous twenty-nine (29) Boiler Operating Days for each Stuart Station Unit to determine total Stuart Station 30-day heat input; and third, divide the total Stuart Station 30-day pounds of NO_x by the total Stuart Station 30-day heat input. A new 30-Day Rolling Average NO_x Emission Rate shall be calculated for each new Boiler Operating Day.

Owners may exclude emissions and Hourly Heat Input that occur during periods of Malfunction from the calculation of the 30-Day Rolling Average NO_x Emission Rate.

41. "30-Day Rolling Average SO₂ Emission Rate" for Stuart Station shall be expressed as lb/mmBTU and calculated in accordance with the following procedure: first, sum the total pounds of SO₂ emitted from each Stuart Station Unit during a Boiler Operating Day and the previous twenty-nine (29) Boiler Operating Days for each Stuart Station Unit to determine the total Stuart Station 30-day pounds of SO₂; second, sum the Hourly Heat Input to each Stuart Station Unit in mmBTU during the Boiler Operating Day and the previous twenty-nine (29) Boiler Operating Days for each Stuart Station Unit to determine the total Stuart Station 30-day heat input; and third, divide the total Stuart Station 30-day pounds of SO₂ by the total Stuart

Station 30-day heat input. A new 30-Day Rolling Average SO₂ Emission Rate shall be calculated for each new Boiler Operating Day.

Owners may exclude from the calculation of the 30-Day Rolling Average SO₂ Emission Rate emissions and Hourly Heat Input that occur during Generation Emergencies declared by PJM Interconnection LLC ("PJM") that affect Stuart Station generation and emissions and Hourly Heat Input that occur during periods of Malfunction.

42. "30-Day Rolling Average SO₂ Removal Efficiency" means the percent reduction in the mass of SO₂ achieved collectively by the Stuart Station Units over a 30-Boiler Operating Day period. This percent reduction shall be calculated in accordance with the following procedure. Step 1: calculate each Stuart Station Unit's percent of potential SO₂ emissions to the atmosphere in accordance with the equation in 40 C.F.R. § 60.50Da(c); provided, however, that Owners shall not use the "as fired" fuel monitoring alternative in § 60.50Da(c)(3) and "Rf," Percent reduction from fuel pretreatment, shall always be considered zero. Step 2: multiply each Stuart Station Unit's percent of potential SO₂ emissions to the atmosphere by its 30-day heat input, as calculated in accordance with Paragraph 41, and sum the results obtained for each Unit. Step 3: sum each Stuart Station Unit's 30-day heat input, as calculated in accordance with Paragraph 40. Step 4: divide the results of Step 2 by Step 3. Step 5: subtract the results of Step 4 from 100 percent. A new 30-Day Rolling Average SO₂ Removal Efficiency shall be calculated for each new Boiler Operating Day.

Except as provided in Paragraph 55 of this Consent Decree, Owners may exclude emissions and Hourly Heat Input data from the calculation of a 30-Day Rolling Average SO₂ Removal Efficiency to the extent that such data have been excluded from the underlying 30-Day Rolling Average SO₂ Emission Rate.

43. "Unit" means, solely for the purposes of this Consent Decree, collectively, the coal pulverizer, stationary equipment that feeds coal to the boiler, the boiler that produces steam for the steam turbine, the steam turbine, the generator, the equipment necessary to operate the generator, steam turbine and boiler, and all ancillary equipment, including pollution control equipment and systems necessary for the production of electricity.

IV. NO_x EMISSIONS

A. NO_x Emission Controls

44. Beginning 30 days after the Effective Date of this Consent Decree, Owners shall comply with a 30-Day Rolling Average NO_x Emission Rate at Stuart Station of not greater than 0.17 lb/mmBTU. Owners shall demonstrate compliance with this requirement beginning 60 days after the Effective Date of this Consent Decree.

45. Owners shall install additional NO_x control technology designed to reduce NO_x emissions to 0.10 lb/mmBTU or lower on at least one Stuart Station Unit by December 31, 2012. Owners shall provide Plaintiffs with copies of executed contracts for the installation of the additional NO_x control technology within sixty (60) days after signing any such contracts. Information provided to Plaintiffs pursuant to this Paragraph shall be considered Confidential Business Information and shall be maintained as confidential pursuant to Paragraph 128 of this Consent Decree. Provided that the NO_x control technology installed by December 31, 2012 achieves an actual 30-Day Rolling Average NO_x Emission Rate of 0.10 lb/mmBTU or less at the Stuart Station Unit on which the NO_x control technology was installed, Owners shall comply with a 30-Day Rolling Average NO_x Emission Rate at the Stuart Station of not greater than 0.15 lb/mmBTU by August 1, 2013, with compliance to be demonstrated beginning on August 30, 2013.

46. If the actual 30-Day Rolling Average NOx Emission Rate achieved with the additional NOx control technology installed pursuant to Paragraph 45 is above 0.10 lb/mmBTU at the Stuart Station Unit on which the NOx control technology was installed, then by April 1, 2013, Owners shall provide to Plaintiffs information regarding the additional or alternative measures Owners plan for the remaining Stuart Station Units to achieve the 30-Day Rolling Average NOx Emission Rate required in Paragraph 47.

47. Beginning on December 31, 2014, Owners shall comply with a 30-Day Rolling Average NOx Emission Rate at Stuart Station of not greater than 0.10 lb/mmBTU. Owners shall demonstrate compliance with this requirement beginning on January 29, 2015.

48. Beginning 30 days after the Effective Date of this Consent Decree, Owners shall not purchase any new catalyst for the SCRs at Stuart Station that has a vendor guarantee of a SO₂ to SO₃ conversion rate of greater than 0.5%.

B. Use of NOx Allowances

49. Owners may not use NOx Allowances for purposes of complying with the 30-Day Rolling Average NOx Emission Rate requirements of Paragraphs 44, 45 and 47 of this Consent Decree. However, nothing in this Consent Decree shall prevent Owners from purchasing or otherwise obtaining NOx Allowances from another source for purposes of complying with state or federal Clean Air Act requirements at Stuart Station to the extent otherwise allowed by law.

50. Nothing in this Consent Decree shall preclude Owners from banking, selling or transferring NOx Allowances allocated to Stuart Station Units.

C. NOx Emissions Monitoring and Compliance

51. In determining 30-Day Rolling Average NOx Emission Rates, Owners shall use CEMS in accordance with the provisions of 40 C.F.R. § 60.49Da(f)(1).

52. Except as provided in Paragraph 40 of this Consent Decree, in determining compliance with the 30-Day Rolling Average NO_x Emission Rate requirements of this Section IV, Owners shall follow the procedures set forth in 40 C.F.R. § 60.48Da.

V. SO₂ EMISSIONS

A. SO₂ Emission Controls

53. Owners shall complete installation of FGDs at each Stuart Station Unit and commence operation of each FGD upon Owners' final acceptance for commercial operation of that FGD. Owners shall operate the FGDs in accordance with good operating practices as soon as the FGDs are commercially accepted.

54. Beginning on July 31, 2009, Owners shall comply with a 30-Day Rolling Average SO₂ Removal Efficiency at Stuart Station of at least ninety-six percent (96%) or a 30-Day Rolling Average SO₂ Emission Rate of no greater than 0.10 lb/mmBTU. Owners shall demonstrate compliance with this requirement beginning on August 29, 2009.

55. If Owners demonstrate compliance with the 96% 30-Day Rolling Average SO₂ Removal Efficiency requirement in Paragraph 54, Owners also shall comply with a 30-Day Rolling Average SO₂ Removal Efficiency at Stuart Station that includes data obtained during periods of Malfunctions. This 30-Day Rolling Average SO₂ Removal Efficiency shall be at least eighty-two percent (82%) from July 31, 2009, to July 30, 2011, with compliance to be demonstrated beginning on August 29, 2009, and shall be at least eighty-four percent (84%) beginning on July 31, 2011, with compliance to be demonstrated beginning on August 29, 2011.

B. Use of SO₂ Allowances

56. Owners may not use SO₂ Allowances for purposes of complying with the 30-Day Rolling Average SO₂ Emission Rate of Paragraph 54 of this Consent Decree or the 30-Day Rolling Average SO₂ Removal Efficiencies of Paragraphs 54 and 55 of this Consent Decree.

However, nothing in this Consent Decree shall prevent Owners from purchasing or otherwise obtaining SO₂ Allowances from another source for purposes of complying with state or federal Clean Air Act requirements at Stuart Station to the extent otherwise allowed by law.

57. Nothing in this Consent Decree shall preclude Owners from banking, selling or transferring SO₂ Allowances allocated to Stuart Station Units.

C. SO₂ Emissions Monitoring and Compliance Demonstration

58. Except as provided in Paragraphs 41 and 42 of this Consent Decree, in determining the 30-Day Rolling Average SO₂ Emission Rate, Owners shall use CEMS in accordance with the provisions of 40 C.F.R. § 60.49Da.

59. Except as provided in Paragraphs 41 and 42 of this Consent Decree, in determining compliance with the 30-Day Rolling Average SO₂ Emission Rate, Owners shall follow the procedures set forth in 40 C.F.R. § 60.48Da.

60. In demonstrating compliance with the 30-Day Rolling Average SO₂ Removal Efficiencies in Paragraphs 54 and 55 of this Consent Decree, Owners shall follow the procedures set forth in Paragraph 42 of this Consent Decree.

VI. PM EMISSIONS

A. PM Emission Limits

61. Beginning on July 31, 2009, Owners shall comply with a PM Emission Rate for Filterable PM at each Stuart Station Unit of no greater than 0.030 lb/mmBTU in accordance with Paragraph 62.

62. By no later than July 31, 2009, and continuing thereafter, Owners shall determine compliance with the PM Emission Rate for Filterable PM established in Paragraph 61 via a stack test at each Stuart Station Unit performed pursuant to the requirements established in the Stuart Station Title V permit using the reference and monitoring methods and procedures

specified in 40 C.F.R. Part 60, Appendix A1, Method 5 or Method 5B (filterable only) as of the Effective Date of this Consent Decree. At Owners' option, subsequently EPA approved methods for measuring Filterable PM also may be used to determine compliance. Use of any particular method shall conform to the EPA requirements specified in 40 C.F.R. Part 60, Appendix A, or any federally approved method contained in the Ohio SIP. Owners shall calculate the PM Emission Rate for Filterable PM from the stack test results in accordance with 40 C.F.R. § 60.8(f).

B. Upgrade of Existing PM Emission Controls

63. By December 31, 2015, Owners shall complete installation of Rigid-Type Electrodes in the ESP at each Stuart Station Unit. Upon completion of the requirements of this Paragraph, Owners shall provide notice to Plaintiffs.

VII. PROHIBITION ON NETTING CREDITS OR OFFSETS FROM REQUIRED CONTROLS

64. Emission reductions at Stuart Station resulting from compliance with the requirements of this Consent Decree shall not be used in calculating a Net Emissions Increase for the purpose of obtaining netting credit under the Clean Air Act's Nonattainment NSR or PSD programs, except that Owners may use emissions reductions resulting from compliance with the requirements of this Consent Decree for purposes of determining whether a Renewable Energy project results in a Net Emissions Increase under the Clean Air Act's Nonattainment NSR or PSD programs.

65. The limitations on the generation and use of netting credits set forth in the previous Paragraph 64 do not apply to emission reductions achieved at Stuart Station that are greater than those required under this Consent Decree or that are achieved earlier than the deadlines imposed by this Consent Decree. For purposes of this Paragraph, emission reductions

from Stuart Station greater than those required under this Consent Decree include emission reductions that result from compliance with emission limits or control requirements that are more stringent than those limits imposed on Stuart Station under this Consent Decree.

66. Nothing in this Consent Decree precludes the emission reductions generated under this Consent Decree from being considered by the State of Ohio or EPA as creditable contemporaneous emission decreases for the purpose of attainment demonstrations submitted pursuant to § 110 of the Clean Air Act, 42 U.S.C. § 7410, or in determining impacts on NAAQS, PSD increment, or air quality related values, including visibility, in a Class I area.

VIII. ADDITIONAL COMMITMENTS

A. Allowance Surrender

67. Prior to January 31, 2017, Owners will transfer to a third party non-profit corporation mutually selected by Plaintiffs and Defendants a total of 5,500 SO₂ Allowances with vintage years between 2010 and 2016, except as set forth in Paragraph 68. Each Owner's Allowance transfer obligation pursuant to this Paragraph relative to the 5,500 SO₂ Allowances will be proportionate to its current Ownership Interest in the Stuart Station, which is DEO: 39%, CSP: 26% and DP&L: 35%.

68. Each Owner may reduce its obligation to transfer Allowances by performing "mitigation measures" consisting of investments in Renewable Energy beyond those investments to be made pursuant to Section VIII.B of this Consent Decree. For every one (1) Megawatt ("MW") investment in mitigation measures made by an Owner prior to January 1, 2016, the amount of Allowances required to be transferred by that Owner shall be reduced by 60 Allowances.

B. Renewable Energy

69. By no later than December 31, 2012, CSP will provide proof to Plaintiffs that it has secured binding long-term purchase power agreements or entered into alternative long-term arrangements after May 1, 2008, to secure a total of 40 MW (nameplate rating) of new Renewable Energy generation capacity, and DEO will provide proof to Plaintiffs that it has secured binding long-term purchase power arrangements or entered into alternative long-term arrangements after May 1, 2008, to secure a total of 60 MW (nameplate rating) of new Renewable Energy generation capacity. Once such proof is made, the Renewable Energy obligations under this Consent Decree are fulfilled.

70. Implementation of the Renewable Energy obligations imposed by this Consent Decree is subject to CSP and/or DEO and the Renewable Energy project(s) obtaining required regulatory Approvals from the state public service commissions and from all other applicable regulators, including Approvals necessary for full cost recovery through retail rates. For purposes of this Subsection B, "Approval" includes, but is not limited to, issuance of a final and non-appealable order by the Public Utilities Commission of Ohio ("PUCO"), or equivalent regulatory authority in any of the states with jurisdiction over CSP, DEO or the Renewable Energy project, authorizing a charge over and above current rates to fully recover the costs of the project, or other equivalent mechanisms to fully recover the costs of the project that the Owner undertaking the project reasonably finds acceptable; all required permits, including federal and state environmental permits and local zoning and building certificates; and, if necessary, issuance of an order by the Ohio Power Siting Board or equivalent authority authorizing construction of the project. Sierra Club retains the right to challenge compliance with this Consent Decree regarding whether the PUCO, or equivalent regulatory authority in any of the states with jurisdiction over CSP, DEO or the Renewable Energy project, authorized full cost recovery of

the Renewable Energy project that the Owner undertaking the Renewable Energy project reasonably finds acceptable. Nothing herein limits the legal rights of any Party pursuant to this Consent Decree. CSP's and DEO's application to the appropriate regulatory authority shall contain terms regarding expected renewable resource capacity factor and/or price fluctuations based upon fluctuations in load served, as applicable. If CSP and/or DEO and the Renewable Energy project(s) have sought and are unable to obtain such Approvals from regulators in any of the states with jurisdiction over CSP, DEO, or the Renewable Energy project(s), despite their timely, reasonable and good faith efforts, CSP and/or DEO shall have no further obligation with respect to any portion of the Renewable Energy commitments under this Consent Decree for which full cost recovery approval has not been obtained.

71. Consistent with Paragraph 69, CSP and/or DEO may, at their sole discretion, satisfy their Renewable Energy obligations imposed by this Consent Decree through the purchase of energy from the requisite amount of capacity or a commitment of capacity not previously used and useful whether owned, purchased or constructed. CSP and/or DEO will request a charge over and above current rates to fully recover the costs of the Renewable Energy project(s) and if such Approval is not obtained pursuant to the energy or capacity option chosen despite their timely, reasonable and good faith efforts, then CSP and/or DEO, as applicable, will have no further obligations under this Subsection B with respect to that portion of the Renewable Energy obligation represented by the applicable application. If such Approval is obtained but, subsequently, a court of competent jurisdiction determines that the PUCO is without the legal authority to establish such a full cost recovery charge, the Owner requesting the full cost recovery charge shall have no further obligation with respect to any portion of the Renewable Energy commitments under this Consent Decree for which full cost recovery Approval has not

been obtained. Once CSP and/or DEO, consistent with their good faith obligations in Paragraph 70, have applied for cost recovery Approval sufficient to meet their Renewable Energy obligations imposed by this Consent Decree either through the purchase of energy or a commitment of capacity, their Renewable Energy obligations imposed by this Consent Decree shall end and CSP and/or DEO shall have no requirement to meet such obligations through the methodology, i.e., purchase of energy or capacity commitment, for which it has not made an application.

72. Nothing in this Section shall preclude CSP and/or DEO from relying on the investments made, or power purchase contracts entered into pursuant to this Consent Decree to demonstrate compliance with, seek renewable energy credits for, or otherwise satisfy the requirements of or participate in any federal, state or local statutory or regulatory programs regarding Renewable Energy or climate change-related requirements.

C. Demand Side Management (DSM)

73. No later than December 31, 2008, DP&L shall file a request with the PUCO for Approval to invest in and recover the costs of DSM projects and initiatives with the objective of reducing annual electric usage by 120 gigawatt hours ("GWh") per year no later than within the calendar year ending December 31, 2018; provided, however, that if DP&L is directed or requested by the PUCO or its Staff to defer the filing date or to file the request as part of a more comprehensive rate plan or filing, DP&L shall promptly contact Plaintiffs to discuss an alternative filing date. In no event shall DP&L file later than the date directed or requested by the PUCO. Upon Approval by PUCO for DP&L to recover its investment and lost revenues through rates above and beyond its current delivery rates, DP&L shall begin making its approved investment in such projects. DP&L shall implement DSM in accordance with the PUCO order.

For purposes of this Subsection C, "Approval" means issuance of a final and non-appealable order by the PUCO authorizing a charge over and above current rates to fully recover the costs and lost revenues associated with the DSM program or other equivalent mechanism to fully recover the costs of and lost revenues associated with the DSM project that DP&L reasonably finds acceptable.

74. Implementation of the DSM obligations imposed by this Consent Decree is subject to DP&L obtaining required regulatory Approvals from PUCO, including Approvals necessary for DP&L to recover through rates the costs of such investment and lost revenues over and above its current delivery rates. Except as provided in Paragraph 75, if DP&L is unable to obtain such Approval from the PUCO despite its timely, reasonable and good faith efforts,, DP&L shall have no further obligations under this Consent Decree with respect to the proposal or implementation of DSM investments.

75. DP&L may request that the charge over and above current rates to fully recover the costs of the DSM projects and initiatives be recovered from all customers taking distribution service from DP&L. However, if Approval is rejected based solely on a determination by the PUCO or a court of competent jurisdiction that it is without the legal authority to establish such a charge, DP&L shall not be released from its obligations with respect to this Subsection C.

76. As soon as practicable but no later than thirty (30) days prior to seeking Approval by the PUCO, DP&L shall share the programs, program design, and program implementation details that DP&L intends to submit to the PUCO with Plaintiffs and shall have at least one meeting with Plaintiffs to discuss DP&L's intended submittal to the PUCO. It is intended that, among other things, such a meeting would include scheduling periodic follow-up

meetings at least once a year to provide further information to Plaintiffs and solicit input from Plaintiffs regarding programs, program design, implementation and results. Information provided to Plaintiffs pursuant to this Paragraph shall be considered Confidential Business Information and shall be maintained as confidential pursuant to Paragraph 128 of this Consent Decree until DP&L makes its filing to the PUCO.

77. The annual electric usage reduction goal set forth above is based on a base line demand and usage assuming a continuation of current usage patterns and trends in load growth and electric use per customer. Electricity usage reductions associated with third-party curtailment service providers licensed by PJM and operating in the DP&L zone or associated with programs undertaken pursuant to federal mandates shall reduce the goal set forth above by a corresponding amount.

78. Nothing herein shall be deemed to preclude a DP&L affiliate that is not subject to the jurisdiction of the PUCO from offering DSM and other energy efficiency programs to DP&L customers or to electric consumers located in other service areas.

79. Nothing in this Section shall preclude DP&L from relying on the investments made in DSM pursuant to this Consent Decree to demonstrate compliance with or otherwise satisfy the requirements of or participate in any federal, state or local statutory or regulatory programs regarding DSM or climate change-related requirements.

D. Funds for Renewable Energy Rebate Program

80. Within one hundred and eighty (180) days after the date of entry of this Consent Decree, Owners shall transfer to a third-party non-profit corporation selected by Plaintiffs, with approval by Owners, which will not be unreasonably withheld, a total of \$200,000 to provide rebates to consumers in Ohio for the purchase of solar hot water heaters.

Plaintiffs or the third-party non-profit corporation will seek to obtain additional funding for the implementation of the solar hot water heater rebate program but, in any event, will ensure that no more than twenty (20) percent of the funds provided for under this Paragraph will be spent on implementation costs for the rebate program. For the purposes of this Paragraph, implementation costs shall include all overhead costs as well as educational efforts and subsequent verification of operability of the solar hot water heaters. Each Owner's monetary obligation pursuant to this Paragraph relative to the \$200,000 will be proportionate to its current Ownership Interest in the Stuart Station, which is DEO: 39%, CSP: 26% and DP&L: 35%.

E. General Provisions

81. The obligations in this Section VIII are enforceable only against the individual Owner specified herein and are not joint and several obligations of the Owners.

IX. PERIODIC REPORTING

82. Beginning sixty (60) days after the end of the first semi-annual period following the Effective Date of this Consent Decree, continuing until termination of this Consent Decree, and except as provided in Paragraph 83, Owners shall send to Plaintiffs a semi-annual report containing information on the following:

- a. The actual 30-Day Rolling Average NO_x Emission Rate for the Stuart Station, as calculated in accordance with Paragraphs 40 and 52 of this Consent Decree.
- b. The actual 30-Day Rolling Average SO₂ Emission Rate for the Stuart Station, as calculated in accordance with Paragraphs 41 and 59 of this Consent Decree.
- c. The actual 30-Day Rolling Average SO₂ Removal Efficiency for the Stuart Station, as calculated in accordance with Paragraphs 42 and 60 of this Consent Decree.

d. The actual 30-Day Rolling Average SO₂ Removal Efficiency for the Stuart Station, as calculated in accordance with Paragraphs 42 and 60 of this Consent Decree but including periods of Malfunction.

e. The results of any stack tests for filterable PM for any Stuart Station Unit, if conducted during the semi-annual period.

f. Any emissions or Hourly Heat Input data that are excluded from any of the above calculations during the semi-annual period.

83. The requirements of Paragraph 82 shall not take effect for the reporting of the 30-Day Rolling Average SO₂ Emission Rate and 30-Day Rolling Average SO₂ Removal Efficiencies until sixty (60) days after the end of the semi-annual period in which the 30-Day Rolling Average SO₂ Emission Rate identified in Paragraph 54 and the 30-Day Rolling Average SO₂ Removal Efficiencies identified in Paragraphs 54 and 55 take effect.

84. Upon request by Plaintiffs, Owners shall make available to Plaintiffs the operator logs or computer printouts regarding boiler operations for days on which any Stuart Station Unit operates but does not meet the definition of a Boiler Operating Day.

X. RESOLUTION OF CLAIMS

85. Claims Based on Actions Occurring Before the Effective Date. Entry of this Consent Decree shall resolve any and all claims of Plaintiffs under the Clean Air Act relating to any actions taken by Owners at Stuart Station prior to the Effective Date, including but not limited to those claims and actions alleged or that could have been alleged in the Complaints and Notice Letters in this civil action.

86. Claims Based on Modifications After the Effective Date. Entry of this Consent Decree also shall resolve all claims of Plaintiffs for pollutants regulated under Parts C or D of Subchapter I of the Clean Air Act, and under regulations promulgated or approved

thereunder as of the date of entry of this Decree, where such claims are based on a modification occurring after the Effective Date that this Consent Decree expressly directs Owners to undertake. The term "modification" as used in this Paragraph shall have the meaning that term is given under the Clean Air Act statute as it existed on the date of lodging of this Consent Decree.

XI. FORCE MAJEURE

87. For purposes of this Consent Decree, a "*Force Majeure* Event" shall mean an event that has been or will be caused by circumstances beyond the control of Owners or any entity controlled by Owners that delays or impedes compliance with any provision of this Consent Decree or otherwise causes a violation of any provision of this Consent Decree despite Owners' reasonable efforts to fulfill the obligation. "Reasonable efforts to fulfill the obligation" include using reasonable efforts to anticipate any potential *Force Majeure* Event and to address the effects of any such event (a) as it is occurring and (b) after it has occurred, such that the delay or violation is minimized to the greatest extent possible.

88. Notice of *Force Majeure* Events. If any event occurs or has occurred that may delay compliance with or otherwise cause a violation of any obligation under this Consent Decree, as to which Owners intend to assert a claim of *Force Majeure*, Owners shall notify Plaintiffs in writing as soon as practicable, but in no event later than twenty-one (21) days following the date that the Owners first knew of the event or by the exercise of due diligence should have known, that the event caused or may cause such delay or violation. In this notice, Owners shall reference this Paragraph of this Consent Decree and describe the anticipated length of time that the delay or violation may persist, the cause or causes of the delay or violation, all measures taken or to be taken by Owners to prevent or minimize the delay or violation, the schedule by which Owners propose to implement those measures, and Owners' rationale for

attributing a delay or violation to a *Force Majeure* Event. Defendants shall adopt all reasonable measures to avoid or minimize such delays or violations.

89. Failure to Give Notice. If Owners materially fail to comply with the notice requirements of this Section, the Plaintiffs may dispute the validity of Owners' claim for *Force Majeure* as to the specific event for which Owners have failed to comply with such notice requirement.

90. Plaintiffs' Response. The Plaintiffs shall notify Owners in writing regarding Owners' claim of *Force Majeure* within twenty (20) business days of receipt of the notice provided under the preceding Paragraph. If the Plaintiffs agree that a delay in performance has been or will be caused by a *Force Majeure* Event, the Parties shall stipulate to an extension of deadline(s) for performance of the affected compliance requirement(s) by a period equal to the delay actually caused by the event. In such circumstances, an appropriate modification shall be made pursuant to Section XX (Modification) of this Consent Decree.

91. Disagreement. If the Plaintiffs do not accept Owners' claim of *Force Majeure*, or if the Parties cannot agree on the length of the delay actually caused by the *Force Majeure* Event, or the extent of relief required to address the delay actually caused by the *Force Majeure* Event, the matter shall be resolved in accordance with Section XIII (Dispute Resolution) of this Consent Decree.

92. Burden of Proof. In any dispute regarding *Force Majeure*, the burden of proof shall be determined in accordance with Ohio law.

93. Events Excluded. Unanticipated or increased costs or expenses associated with the performance of Owners' obligations under this Consent Decree shall not constitute a *Force Majeure* Event.

94. Potential Force Majeure Events. The Parties agree that, depending upon the circumstances related to an event and Owners' response to such circumstances, the kinds of events listed below are among those that could qualify as *Force Majeure* Events within the meaning of this Section: construction, labor, or equipment delays; Malfunction of a Unit or emission control device; natural gas supply interruption; acts of God; acts of war or terrorism; and orders by a court, a government official, government agency, or other regulatory body acting under and authorized by applicable law that directs Owners to operate Stuart Station in response to a systemwide (state-wide or regional for the region that includes Stuart Station) Generation Emergency. Depending upon the circumstances and Owners' response to such circumstances, failure of a federal, state or local agency or commission to issue a necessary permit, license, approval or order may constitute a *Force Majeure* Event where the failure of the authority to act is beyond the control of Owners and Owners have taken all reasonable steps to obtain the necessary permit, license, approval or order.

95. As part of the resolution of any matter submitted to this Court under Section XIII (Dispute Resolution) of this Consent Decree regarding a claim of *Force Majeure*, the Parties by agreement, or this Court by order, may in appropriate circumstances extend or modify the schedule for completion of work under this Consent Decree to account for the delay in the work that occurred as a result of any delay agreed to by Plaintiffs or approved by the Court or excuse non-compliance with any other requirement of this Consent Decree attributable to a *Force Majeure* event.

XII. MALFUNCTION EVENTS

96. If Owners intend to exclude a period of Malfunction, as defined in Paragraph 17, from the calculation of a 30-Day Rolling Average NO_x Emission Rate in Paragraphs 44, 45 or 47, the 30-Day Rolling Average SO₂ Emission Rate in Paragraph 54, or the 96% 30-Day

Rolling Average SO₂ Removal Efficiency in Paragraph 54, Owners shall notify Plaintiffs in writing as soon as practicable, but in no event later than twenty-one (21) days following the date the Malfunction occurs.

97. In the notice required pursuant to Paragraph 96, Owners shall describe the cause or causes of the Malfunction, the measures taken or to be taken by Owners to minimize the duration of the Malfunction, the measures taken or to be taken by Owners to avoid recurrence of the Malfunction in the future, and the schedule by which Owners propose to implement those measures.

98. A Malfunction, as defined in Paragraph 17 of this Consent Decree, does not constitute a *Force Majeure* Event unless the Malfunction also meets the definition of a *Force Majeure* Event, as provided in Section XI. Conversely, a period of Malfunction may be excluded by Owners from the calculations of Emission Rates and Removal Efficiencies, as allowed under Paragraph 96 of this Consent Decree, regardless of whether the Malfunction constitutes a *Force Majeure* Event.

XIII. DISPUTE RESOLUTION

99. The dispute resolution procedure provided by this Section shall be available to resolve all disputes arising under this Consent Decree, including any alleged breach of this Consent Decree by one of the Parties, provided that the party invoking such procedure has first made a good faith attempt to resolve the matter with the other party.

100. The dispute resolution procedure required herein shall be invoked by one party giving written notice to the other party advising of a dispute pursuant to this Section. The notice shall describe the nature of the dispute and shall state the noticing party's position with regard to such dispute. The party receiving such a notice shall acknowledge receipt of the notice,

and the Parties shall expeditiously schedule a meeting or telephone conference to discuss the dispute informally not later than fourteen (14) days following receipt of such notice.

101. Disputes submitted to dispute resolution under this Section shall, in the first instance, be the subject of informal negotiations among the Parties. Such period of informal negotiations shall not extend beyond thirty (30) calendar days from the date of the first meeting among the disputing Parties' representatives unless they agree in writing to shorten or extend this period. During the informal negotiations period, the Parties may also submit their dispute to a mutually-agreed-upon alternative dispute resolution ("ADR") forum if the Parties agree that the ADR activities can be completed within the 30-day informal negotiations period (or such longer period as the Parties may agree to in writing).

102. If the Parties are unable to resolve the dispute through the informal process described above, the disputing party waives its rights to further dispute the issue unless it files a petition or other filing with the Court describing the dispute and serves it on the other Parties. The other party shall have forty-five (45) days after the receipt of the petition to file and serve a written response. The filing party will then have fifteen (15) days to file a reply.

103. As part of the resolution of any dispute under this Section, in appropriate circumstances the Parties by agreement, or this Court by order, may extend or modify the schedule for the completion of the activities required under this Consent Decree to account for the delay that occurred as a result of dispute resolution or may excuse non-compliance with any other requirement of this Consent Decree that occurred during the dispute resolution period. Owners shall not be precluded from asserting that a *Force Majeure* Event has caused or may cause a delay in complying with the extended or modified schedule or has resulted in non-

compliance with any other requirement of this Consent Decree, except as otherwise provided for in this Consent Decree.

XIV. PERMITS

104. Nothing in this Consent Decree shall be construed to alter or change Owners' obligations under Ohio law to secure a permit to authorize construction or operation of any device, including all preconstruction, construction, and operating permits required under state law. Owners shall make such application in a timely manner. When permits are required as described above, Owners shall complete and submit applications for such permits to the appropriate authorities to allow time for all legally required processing and review of the permit request, including requests for additional information by the permitting authorities.

105. Notwithstanding Paragraph 104, nothing in this Consent Decree shall be construed to require Owners to apply for or obtain a PSD or Nonattainment NSR permit for physical changes in, or changes in the method of operation of, any Stuart Station Unit that would give rise to claims resolved by Section X (Resolution of Claims) of this Consent Decree.

106. Prior to termination of this Consent Decree, Owners shall obtain revisions to the Stuart Station's Title V permit to incorporate the applicable emissions limitations and associated monitoring requirements for NO_x, SO₂ and filterable PM identified in Paragraphs 47, 51-52, 54-55, 58-60, and 61-62 of this Consent Decree.

107. After the requirements identified in Paragraph 106 are incorporated into the Stuart Station Title V permit, the Owners shall include these requirements in any Stuart Station Title V permit renewal applications unless the Stuart Station Units become subject to emissions limitations that are no less stringent than the emissions limitations in Paragraphs 47, 54-55, and 61 of this Consent Decree pursuant to a federal, state or local statutory or regulatory program that is enforceable under 42 U.S.C. § 7604. This Paragraph shall survive the termination of this

Consent Decree and the Court shall continue to retain jurisdiction to enforce the requirements in this Paragraph until such time that the Stuart Station Units become subject to emissions limitations that are no less stringent than the emissions limitations in Paragraphs 47, 54-55, and 61 of this Consent Decree pursuant to a federal, state or local statutory or regulatory program that is enforceable under 42 U.S.C. § 7604, or until such time that the emissions limitations in Paragraphs 47, 54-55 and 61 of this Consent Decree are incorporated into the Ohio SIP.

108. Owners shall provide Plaintiffs with a copy of any permit application required pursuant to this Section, including any permit application to revise the Stuart Station Title V permit, to allow for timely participation in any public comment period on the permit application.

109. If Owners sell or transfer to an entity unrelated to Owners ("Third Party Purchaser") part or all of their Ownership Interests in a Stuart Station Unit covered under this Consent Decree, Owners shall comply with the requirements of Paragraph 113 with regard to that Unit prior to any such sale or transfer unless, following any such sale or transfer, Owners remain the holder of the Title V or other federally enforceable permit for such facility.

XV. NOTICES

110. Unless otherwise provided herein, whenever notifications, submissions, or communications are required by this Consent Decree, they shall be made in writing and addressed as follows:

As to Plaintiffs:

Pat Gallagher
Director, Environmental Law
Sierra Club
85 Second Street, 2nd Floor
San Francisco, CA 94105

Pat.Gallagher@sierraclub.org

and

Marilyn Wall
515 Wyoming Ave
Cincinnati, OH 45215

marilyn.wall@env-comm.org

and

Robert Ukeiley
Law Office of Robert Ukeiley
435R Chestnut St., Suite 1
Berea, KY 40403

rukeiley@igc.org

As to DP&L:

Arthur G. Meyer
Senior Vice President
Corporate, Environmental & Regulatory Affairs
The Dayton Power and Light Company
1065 Woodman Drive
Dayton, OH 45432

Arthur.meyer@dplinc.com

With a copy to:

Douglas C. Taylor
Senior Vice President and General Counsel
The Dayton Power and Light Company
1065 Woodman Drive
Dayton, OH 45432

Doug.taylor@dplinc.com

As to DEO:

President
Duke Energy Ohio, Inc.
139 East Fourth Street
Cincinnati, OH 45202
Attn: Ms. Sandra P. Meyer

spmeyer@duke-energy.com

With a copy to:

Chief Legal Officer
Duke Energy Corp.
P.O. Box 1006
Charlotte, NC 28201-1006
Attn: Mr. Marc E. Manly

Marc.Manly@cinergy.com

As to CSP:

John M. McManus
Vice President - Environmental Services
American Electric Power Service Corporation
1 Riverside Plaza
Columbus, OH 43215

jmmcmanus@aep.com

With a copy to:

Janet J. Henry
Associate General Counsel - EHS
American Electric Power Service Corporation
1 Riverside Plaza
Columbus, OH 43215

jjenry@aep.com

111. All notifications, communications or submissions made pursuant to this Section shall be sent either by: (a) overnight mail or delivery service; (b) certified or registered mail, return receipt requested; or (c) electronic transmission, unless the recipient is not able to review the transmission in electronic form. All notifications, communications and transmissions (a) sent by overnight, certified or registered mail shall be deemed submitted on the date they are postmarked, or (b) sent by overnight delivery service shall be deemed submitted on the date they

are delivered to the delivery service. All notifications, communications, and submissions made by electronic means shall be electronically signed, and shall be deemed submitted on the date that sender receives written or electronic acknowledgment of receipt of such transmission.

112. Any party may change either the notice recipient or the address for providing notices to it by serving the other Parties with a notice setting forth such new notice recipient or address.

XVI. SALES OR TRANSFERS OF OWNERSHIP INTERESTS

113. If Owners propose to sell or transfer an Ownership Interest to a Third Party Purchaser, they shall advise the Third Party Purchaser in writing of the existence of this Consent Decree prior to such sale or transfer and shall send a copy of such written notification to the Plaintiffs pursuant to Section XV (Notices) of this Consent Decree and to the Court before such proposed sale or transfer. Such notice shall be considered Confidential Business Information and kept as confidential by the Plaintiffs in accordance with Paragraph 128 of this Consent Decree.

114. The Third Party Purchaser and remaining Owners may execute, and submit to the Court for approval, a modification pursuant to Section XX (Modification) of this Consent Decree making the Third Party a party to this Consent Decree and jointly and severally liable with Owners for all the requirements of this Decree that may be applicable to the transferred or purchased Interests. This Consent Decree shall not be construed to impede the transfer of any Ownership Interests between Owners and any Third Party Purchaser as long as the requirements of this Section are met.

115. If all of an Owner's Ownership Interest is to be transferred to a Third Party Purchaser, Owners and the Third Party Purchaser may execute a modification that relieves the Owner transferring its Ownership Interest of its liability under this Consent Decree for, and makes the Third Party Purchaser liable for, all obligations and liabilities under this Consent

Decree. Upon approval of such modification by the Court, the Owner transferring its Ownership Interest to the Third Party Purchaser shall be relieved of any further obligations with respect to this Consent Decree.

XVII. NOTICE OF DECREE

116. The Parties agree to cooperate in good faith in order to obtain the Court's review and entry of this Consent Decree.

117. Pursuant to 42 U.S.C. § 7604(c)(3), this Consent Decree shall be lodged with the Court and simultaneously provided to the United States for review and comment for a period not to exceed forty-five (45) days.

118. If the United States does not object or intervene within forty-five (45) days of receipt, the Parties shall submit a joint motion to the Court seeking entry of the Consent Decree. If the United States objects or intervenes in this proceeding, the Parties will work together and with the United States to determine whether this matter can be resolved without further litigation.

XVIII. EFFECTIVE DATE

119. The Effective Date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court. The Parties consent to entry of this Consent Decree without further notice except as provided in Section XVII.

XIX. RETENTION OF JURISDICTION

120. The Court shall retain jurisdiction of this case after entry of this Consent Decree for purposes of implementing and enforcing the terms and conditions of the Consent Decree and adjudicating disputes under Section XIII (Dispute Resolution) until termination of the Decree.

XX. MODIFICATION

121. The terms of this Consent Decree may be modified only by a subsequent written agreement signed by both Parties. Where the modification constitutes a material change to any term of this Consent Decree, it shall be effective only upon approval by the Court.

XXI. GENERAL PROVISIONS

122. This Consent Decree is not a permit. Compliance with the terms of this Consent Decree does not guarantee compliance with all applicable federal, state, or local laws or regulations. The emission rates set forth herein do not relieve Owners from any obligation to comply with other state and federal requirements under the Clean Air Act at Stuart Station.

123. Every term expressly defined by this Consent Decree shall have the meaning given to that term by this Consent Decree and, except as otherwise provided in this Consent Decree, every other term used in this Consent Decree that is also a term under the Act or the regulations implementing the Act shall mean in this Consent Decree what such term means under the Act or those implementing regulations.

124. All references in this Consent Decree to statutory or regulatory provisions by specific citation shall refer to the language of those provisions as they exist on the date of lodging of this Consent Decree.

125. Performance standards, emissions limits, and other quantitative standards set by or under this Consent Decree must be met to the number of significant digits in which the standard or limit is expressed. Owners shall round the third significant digit to the nearest second significant digit, or the fourth significant digit to the nearest third significant digit, depending upon whether the limit is expressed to two or three significant digits. For example, if an actual Emission Rate is 0.104, that shall be reported as 0.10, and shall be in compliance with an Emission Rate of 0.10, and if an actual Emission Rate is 0.105, that shall be reported as 0.11,

and shall not be in compliance with an Emission Rate of 0.10. Owners shall report data to the number of significant digits in which the standard or limit is expressed.

126. This Consent Decree does not limit, enlarge or affect the rights of any party to this Consent Decree as against any third parties.

127. This Consent Decree constitutes the final, complete and exclusive agreement and understanding between the Parties with respect to the settlement embodied in this Consent Decree, and supersedes all prior agreements and understandings between the Parties related to the subject matter herein. No document, representation, inducement, agreement, understanding, or promise constitutes any part of this Consent Decree or the settlement it represents, nor shall they be used in construing the terms of this Consent Decree.

128. Certain information provided by Owners to Plaintiffs pursuant to this Consent Decree may be considered "Confidential Business Information." Any information that Owners designate as "Confidential Business Information" shall be maintained as confidential by the Parties consistent with the terms of the Stipulated Protective Order Regarding Confidentiality of Documents (Dkt No. 42) entered by this Court in this matter.

XXII. SIGNATORIES AND SERVICE

129. Each undersigned representative of the Parties certifies that he or she is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind to this document the Party he or she represents.

130. This Consent Decree may be signed in counterparts, and such counterpart signature pages shall be given full force and effect.

XXIII. TERMINATION OF ENFORCEMENT UNDER DECREE

131. By agreement of the Parties or by the Court in response to a petition by a Party, each of the obligations contained in this Consent Decree may be terminated independently

of the other obligations upon a demonstration that the obligation has been fulfilled and, to the extent required herein, that the obligation has been incorporated into Stuart Station's Title V permit. Except as provided in Paragraph 107, the Consent Decree may be terminated in its entirety by agreement of the Parties or by the Court in response to a petition by a Party after all obligations in Sections IV, V, VI and VIII of this Consent Decree have been fulfilled.

XXIV. FINAL JUDGMENT

132. Upon approval and entry of this Consent Decree by the Court, this Consent Decree shall constitute a final judgment in the above-captioned matter between Plaintiffs and Owners.

SO ORDERED, THIS _____ DAY OF _____, 2008.

THE HONORABLE EDMUND A. SARGUS, JR.
UNITED STATES DISTRICT COURT JUDGE

Signature Page for Consent Decree in:

Sierra Club and Marilyn Wall

v.

The Dayton Power & Light Co., et al., No. 2:04-cv-905 (S.D. Ohio.)

FOR DEFENDANT THE DAYTON POWER AND LIGHT COMPANY:

A handwritten signature in dark ink, appearing to read "P. M. Barbas", is written over a horizontal line.

Paul M. Barbas
President & CEO
The Dayton Power and Light Company


Signature Page for Consent Decree in:

Sierra Club and Marilyn Wall

v.

The Dayton Power & Light Co., et al., No. 2:04-cv-905 (S.D. Ohio.)

FOR DEFENDANT DUKE ENERGY OHIO, INC.:



Sandra P. Meyer
President
Duke Energy Ohio, Inc.

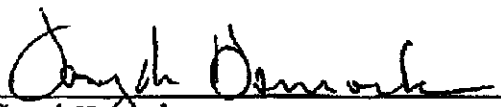
Signature Page for Consent Decree in:

Sierra Club and Marilyn Wall

v.

The Dayton Power & Light Co, et al., No. 2:04-cv-905 (S.D. Ohio.)

FOR DEFENDANT COLUMBUS SOUTHERN POWER COMPANY:


Mr. Joseph Hamrock
President & COO
Columbus Southern Power Company

PRIVILEGED AND CONFIDENTIAL
FOR SETTLEMENT PURPOSES ONLY
FRE 408 COMMUNICATION
DRAFT - 7/31/08

Signature Page for Consent Decree in:

Sierra Club and Marilyn Wall

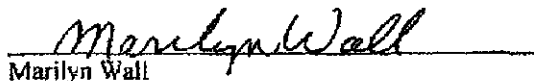
v.

The Dayton Power & Light Co., et al., No. 2:04-cv-905 (S.D. Ohio.)

FOR SIERRA CLUB AND MARILYN WALL:



Pat Gallagher, Director, Environmental Law Program
Sierra Club



Marilyn Wall

IP 99-1693-C M/S USA v Cinergy [2]
Judge Larry J. McKinney

Signed on 05/29/09

INTENDED FOR PUBLICATION AND PRINT

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF INDIANA
INDIANAPOLIS DIVISION

UNITED STATES OF AMERICA,)	
)	
Plaintiff,)	
vs.)	NO. 1:99-cv-01693-LJM-JMS
)	
CINERGY CORPORATION,)	
PSI ENERGY, INC.,)	
CINCINNATI GAS & ELECTRIC CO,)	
)	
Defendants.)	

UNITED STATES DISTRICT COURT
SOUTHERN DISTRICT OF INDIANA
INDIANAPOLIS DIVISION

UNITED STATES OF AMERICA,)	
Plaintiff,)	
)	
STATE OF NEW YORK, STATE OF NEW)	
JERSEY, STATE OF CONNECTICUT,)	
HOOSIER ENVIRONMENTAL COUNCIL,)	
and OHIO ENVIRONMENTAL COUNCIL,)	
Plaintiff-Intervenors,)	
)	
vs.)	1:99-cv-1693-LJM-JMS
)	
CINERGY CORP., PSI ENERGY, INC., and))	
THE CINCINNATI GAS & ELECTRIC)	
COMPANY,)	
Defendants.)	

MEMORANDUM OPINION & ORDER

On September 28, 2007, this Court granted partial summary judgment in favor of plaintiff, the United States of America (the "Government"), and certain plaintiff-intervenors, the Hoosier Environmental Council and the Ohio Environmental Council, on their claims that defendants, Cinergy Corp., PSI Energy, Inc., and the Cincinnati Gas & Electric Company (collectively, "Cinergy"), violated the terms of a 1998 Administrative Order and the provisions of an Ohio State Implementation Plan ("SIP") that established limits on particulate matter ("PM") emissions at Cinergy's plant in Beckjord, Ohio. Docket No. 984.

On May 5, through May 22, 2008, this Court presided over a Jury Trial in this matter with respect to the Government's, and plaintiff-intervenors', the States of New York, New Jersey and Connecticut, and the Hoosier Environmental Council and the Ohio Environmental Council (all plaintiffs, collectively, "Plaintiffs"), claims that Cinergy violated

the New Source Review ("NSR") provisions of the Clean Air Act ("CAA") when it performed certain work on its coal-fired boiler units at several of its facilities in Indiana and Ohio without first obtaining a permit. On May 22, 2008, the Jury returned a verdict in favor of Plaintiffs on the following projects: (1) the front wall radiant superheater replacement project at Wabash River, Indiana, unit 2 from June 1989 to July 1989; (2) the high temperature finishing superheater tubes and upper reheater tubing assemblies replacement project at Wabash River, Indiana, unit 2 from May 1992 to September 1992; (3) the finishing, intermediate, and radiant superheater tubes and upper reheat tube bundles replacement project at Wabash River, Indiana, unit 3 from June 1989 to October 1989; and (4) the boiler pass and heat recovery actions replacement project at Wabash River, Indiana, unit 5 from February 1990 to May 1990. Docket Nos. 1338 & 1339.

On February 2, through February 6, 2009, this Court presided over a Bench Trial on the appropriate remedy for the violations found by the Court as a matter of law at Beckjord, and by the Jury after a trial on the merits at Wabash River. Docket Nos. 1581-85. This Memorandum Opinion & Order is intended to serve as the Court's findings of fact and conclusions of law after said Bench Trial as contemplated by Rule 52(a) of the Federal Rules of Civil Procedure. Any factual statement or finding more appropriately considered a conclusion of law shall be so deemed, and vice versa.

I. FACTUAL BACKGROUND

A. WABASH RIVER PLANT

Cinergy's Wabash River plant is located in Vigo County, Indiana, near the City of Terre Haute. (Docket No. 1499, at No. 8.) The Wabash River plant has five coal-fired boiler generating units: Wabash River units 2, 3, and 4, are 90 megawatt ("MW") gross units that went online in 1953, 1954, and 1955, respectively; unit 5 is a 103 MW gross unit that went online in 1968; and unit 6 is a 342 MW gross unit that went online in 1968. (Remedy Tr. at 2-330 to 331; Docket No. 1499, at Nos. 11, 13, 14, 16, 17, 19; Pls.' Ex. 1955, at PSI-0083210.) All of the Wabash River units vent their emissions through a common smokestack. (Remedy Tr. at 1-31, 2-330 to 331; Pls.' Ex. 2133; Secrest, Nov. 13, 2008, Dep., at 49-64.) Together, Wabash units 2 through 6 burn approximately 2 million tons of coal in a typical year. (Remedy Tr. at 22-331.) Cinergy tends to view units 2 through 5, the smaller units, collectively. (*Id.* 4-659.)

By the mid-1980s Cinergy, through its predecessor in interest, Public Service of Indiana ("PSI"), knew that the forced outage rate of a unit increases and availability decreases with age. (Pls.' Ex. 1955, at PSI 0083177.) Moreover, Cinergy knew that the forced outage rate typically begins rising quickly at about 30 years of operation. (*Id.* at PSI-0083177, 0083212.)

In the mid-1980s, Cinergy began a program to evaluate whether it was more economic to "refurbish" the units at Wabash River or to replace them with new units. (*Id.* at PSI-0083187.) In or around February 1985, during hearings before the Public Service Commission of Indiana, James E. Benning ("Benning"), then Executive Director-Fossil Power Operations Support at PSI, testified that the company's "refurbishment plan", also

referred to as a "renovation plan" or a "plant life extension plan," had the "ultimate goal . . . to extend the life of existing generating plants so as to defer the need to build new, costly generating units." (*Id.* at PSI-0083172.) Benning stated that the company's program was "designed to allow operation of its existing generating plants at the same, or possibly even greater, levels of reliability and efficiency through the year 2003." (*Id.*) The Wabash River projects at issue in this case were part of this refurbishment plan. (Liability Tr. at 2-271 to 272, 2-300 to 302, 2-306, 2-315 to 317.) The company's goal with respect to the Wabash River units was to extend their life fifteen years beyond their current life expectancy date of 1993. (Pls.' Ex. 1319, at CINWA002121-22.)

On May 22, 2008, the Jury in this matter found that a reasonable power plant owner or operator would have expected a net increase of 40 tons or more in SO₂ and/or NO_x emissions as a proximate result of the refurbishment projects at Wabash River units 2, 3, and 5. Docket No. 1338. Specifically, the Jury found that Cinergy violated the CAA when it failed to obtain an NSR permit for the following projects: (1) the front wall radiant superheater replacement project at Wabash River, Indiana, unit 2 from June 1989 to July 1989, because of increased emissions of SO₂; (2) the high temperature finishing superheater tubes and upper reheater tubing assemblies replacement project at Wabash River, Indiana, unit 2 from May 1992 to September 1992, because of increased emissions of SO₂; (3) the finishing, intermediate, and radiant superheater tubes and upper reheat tube bundles replacement project at Wabash River, Indiana, unit 3 from June 1989 to October 1989, because of increased emissions of both SO₂ and NO_x; and (4) the boiler pass and heat recovery actions replacement project at Wabash River, Indiana, unit 5 from February

1990 to May 1990, because of increase emissions of both SO₂ and NO_x. Docket Nos. 1335, 1338 & 1339.

B. EMISSIONS AT WABASH RIVER

During the first liability phase trial in May 2008, Plaintiff's expert, Dr. Richard Rosen ("Dr. Rosen"), presented the annual baseline emission levels of SO₂ and/or NO_x before the earliest project was performed at each unit ("Rosen baseline"). (Liability Tr. at 6-951 to 953; Pls.' Ex. 1549.) Specifically, for the 1989 project at Wabash River unit 2, the SO₂ baseline emission level was 5,641 tons per year; for the 1989 project at Wabash River unit 3, the SO₂ baseline emission level was 4,484 tons per year; and for the 1990 project at Wabash River unit 5, the SO₂ baseline emission level was 4,245 tons per year. (Pls.' Ex. 1549.)

With respect to NO_x, the annual baseline emissions level for the 1989 project at Wabash River unit 3, was 1,201 tons per year, and the annual baseline emissions level for the 1990 project at Wabash River unit 5, was 1,156 tons per year. (Liability Tr. at 6-952 to 953; Pls.' Ex. 1549.)

Wabash River units 2, 3, and 5, are still in service as of the date of this Order. (Remedy Tr. at 2-309.) In January 2009, Cinergy began running Wabash River units 2, 3, and 5, at the annual Rosen baseline emissions levels described above. (*Id.* at 4-731 to 732.)

Since the modifications were performed, Cinergy has emitted approximately 378,000 tons of SO₂ from Wabash River units 2, 3, and 5, through the end of 2007. (*Id.* at 2-208 to 209, 2-320; Pls.' Ex. 2112B.) Since the modifications were performed, Cinergy has

emitted approximately 49,000 tons of NO_x from Wabash River units 3 and 5, through the end of 2007. (Remedy Tr. at 2-308 to 309; Pls.' Ex. 2112B.)

For purposes of this Memorandum Opinion and Order, the term "excess emissions" means "actual emissions that would have exceeded levels of emissions that would have been allowed had permits been issued at the time the modification took place, looking back." (Remedy Tr. at 4-881.) Calculations for excess emissions were performed by party experts for various types permits for which Cinergy might have applied and for various types of pollution control systems that might have been installed if Cinergy had applied for permits under NSR. The type of pollution control equipment that was required at the time of the projects depended upon the designation of the area in which the Wabash River plant was located. (*Id.* 2-307.)

At the time of the projects, the Wabash River plant was located in a nonattainment area with respect to SO₂ emissions. (*Id.* at 2-312.) Dr. Phyllis Fox ("Dr. Fox"), Plaintiffs' expert, testified that if Cinergy had applied for a permit under NSR for each of the Wabash River projects with respect to SO₂, it would have been required to install lowest achievable emissions rate ("LAER") technology. (*Id.* at 2-307.) There is no dispute between the parties that LAER for SO₂ at the time of the projects would have been a wet scrubber or wet flue gas desulfurization ("FGD") unit. (*Id.* at 2-307; *id.* at 3-588.) There is a dispute, however, over the removal efficiency of the FGD's available at the time of the projects.

Dr. Fox opined that an FGD at the time could remove 95% of the SO₂ from the flue gas. (*Id.* at 2-314.) Dr. Fox came to her conclusion based on the installation of an FGD on a unit at a Pennsylvania plant, known as Mitchell unit 3, in 1982, pursuant to a consent decree. (*Id.* at 2-318.) In that case, Dr. Fox testified that the consent decree required 95%

removal efficiency and that the data from the installed unit showed that the unit removed 99% of the SO₂ from the flue gas. (*Id.* at 2-318 to 319.) In addition, the vendor that constructed the Mitchell unit 3 FGD applied for a patent on the process at a 99% removal efficiency rate. (*Id.* at 2-319.) One other plant, Harry Allen in Nevada, had been issued a permit for an FGD with a 95% removal efficiency; but that plant had never been built. (*Id.*) Prior to 1999, Dr. Fox was also aware of papers being presented in San Francisco and in other parts of the United States reporting on FGD efficiencies of 95% to 96% in the United States. (*Id.* at 2-319 to 320.) Assuming Cinergy had installed an FGD with a 95% removal rate, the excess emissions of SO₂ from Cinergy's Wabash River units 2, 3, and 5, collectively, was a total of 359,000 tons, in the time period from the date of the projects through 2007. (*Id.* 2-230 to 231.)

Cinergy's expert, William DePriest ("DePriest"), testified that LAER at the time of the projects was an FGD that removed 90% of the SO₂ from the flue gas. (*Id.* at 3-588.) DePriest opined that the Mitchell unit 33 FGD was of a unique design, which would not have been the most economical choice for FGDs at the time. (*Id.* at 3-589.) Assuming Cinergy had installed an FGD with a 90% removal rate, the excess emissions of SO₂ from Cinergy's Wabash River units 2, 3, and 5, collectively, was a total of 340,000 tons, in the time period from the date of the projects through 2007. (*Id.* at 2-321 to 322.)

Another Cinergy expert, Thomas Rarick ("Rarick"), testified that instead of installing LAER at the time of the projects, Cinergy would have sought a synthetic minor permit cap on SO₂ emissions at its Wabash River plant. (*Id.* at 2-322, 4-883, 4-897, 5-937.) The synthetic minor permit cap would have capped SO₂ emissions at the Wabash River plant at pre-project baseline levels. (*Id.* at 4-883.) With such a permit, Cinergy would have had

to limit future production capacity. (Pearl Oct. 30, 2008, Rule 30(b)(6) Dep. at 51; Defs.' Ex. DR142, at GAL-096179.)

Cinergy has never obtained a synthetic minor permit for a coal-fired unit. (Pearl Oct. 30, 2008, Rule 30(b)(6) Dep. at 60.) In fact, Cinergy representative Steven L. Pearl ("Pearl") testified that synthetic minor permits are more conducive to combustion turbine units, which are "peaking units," operating only at times of peak demand. (*Id.* at 60-61.) Pearl testified that, typically, coal-fired units are "base-load units" that Cinergy would "want . . . available to operate at all times, so [it is] much more hesitant to restrict their operation." (*Id.* at 61.) Pearl and Rarick agree that whether a synthetic minor permit would have been compatible with any of the projects at issue in this case would require an economic evaluation. (*Id.* at 60; Remedy Tr. at 5-935 to 936.) Cinergy never made such an evaluation. (Remedy Tr. at 5-936.)

Hypothetically, even if Cinergy would have applied for and obtained a synthetic minor permit that would have capped SO₂ emissions at the Wabash River plant to the Rosen baseline emissions level, Cinergy has emitted approximately 120,000 tons of excess SO₂ through December 2007. (*Id.* at 2-323 to 324, 5-939 to 941.)

With respect to NO_x, at the time of the projects, the Wabash River plant was in an area that was designated attainment for NO_x. As a result of this status, Cinergy would have been required to install best available control technology ("BACT") if it had applied for and obtained an NSR permit. (*Id.* at 2-306 to 307, 2-311 to 312.) The parties disagree over what would have been considered BACT at the time of the Wabash River projects.

Plaintiffs' expert, Dr. Fox, testified that BACT for NO_x in the late 1980s was selective catalytic reduction ("SCR") technology. (*Id.* at 2-325.) Dr. Fox explained that SCR had not

been installed on a coal-fired power plant in the United States in the late 1980s, but the time was ripe because SCR had been installed on such units overseas, particularly in Germany, Austria, and Japan. (*Id.* at 2-325 to 326.) Furthermore, SCR had widespread use on gas- and oil-fired plants in the United States. (*Id.* at 2-326.) The first SCR in the United States for a coal-fired boiler was permitted in late 1990. (*Id.* at 2-326 to 327.) Dr. Fox concluded that any problems associated with high-sulfur coals used in the United States had been resolved in foreign countries and would not impede application of SCR to coal-fired plants in the United States. (*Id.* at 2-327 to 328.)

Dr. Fox calculated the NO_x excess emissions for the Wabash River plant if SCR had been installed at the time of the projects to be 30,000 tons through the year 2007. (*Id.* at 2-328.)

In contrast, Cinergy's experts, Rarick and DePriest, testified that BACT for NO_x emissions control at the time of the Wabash River projects on units 3 and 5 was a low-NO_x burner with an emission limitation of 0.6 pounds per million BTUs. (*Id.* at 4-889, 3-561 to 562.) Rarick testified that in his review of the RACT/BACT/LAER Clearinghouse, which is a database of technology decisions that have been made under NSR programs and is managed by the EPA, and state and local environmental protection agencies, BACT at the time of the Wabash River projects was not SCR. (*Id.* at 4-885 to 886.) Rarick stated that the RACT/BACT/LAER Clearinghouse data supported a conclusion that low-NO_x burners were BACT at the time of the Wabash River projects because there were numerous entries that identified low-NO_x burners as the required BACT for a number of coal-fired projects preceeding and up to the date of the Wabash River modifications. (*Id.* at 4-889.)

In forming his conclusion that SCR was not BACT at the time of the Wabash River projects, Rarick also considered a statement made by the EPA in June 1991 in public rule-making documents regarding proposed revisions to the PSD regulations. (*Id.* at 4-887.) At 56 Federal Register 27638, the EPA stated that "[SCR] and SNCR are not in use in this country as retrofit technologies for coal-fired boilers and the DOE, or Department of Energy sponsored projects, have not yet been demonstrated." (*Id.* at 4-887 to 888.) In addition, at the same citation under a section entitled "Utility BACT Presumption for NO_x," the EPA stated, "In general, this will call for the use of combustion modification and/or low-NOX [sic] burners." (*Id.* at 4-890.) Although the EPA did not adopt this particular rule-making initiative, Rarick finds it persuasive evidence of what the EPA considered BACT at the time it was written. (*Id.* at 4-888.)

At the time of the modification to unit 5, Cinergy installed a low-NO_x burner that would have met an emissions limitation of 0.6 pounds per million BTU. (*Id.* at 4-889.) Such a limitation would have been measured on a 30-day rolling average. (*Id.* at 5-944.) Although Cinergy did not install a low-NO_x burner on unit 3 at the time it made the modification to that unit, it did install such a burner on unit 3 a few years later. (*Id.* at 4-889.) Even with these installations, Cinergy's excess emissions of NO_x would have totaled 4,865 tons, through 2009. (*Id.* at 5-946 to 947.)

Rarick opined that at the time of projects, installation of BACT for NO_x emissions would have been the most reasonable presumption for how Cinergy would have applied for a permit. (*Id.* at 5-947 to 948.)

C. HARM CAUSED BY EXCESS EMISSION AT WABASH RIVER

1. PM2.5

With respect to SO₂ emissions, Dr. Fox testified that the annual excess emissions of SO₂ is approximately 23,000 tons. (*Id.* at 2-321, 2-328.) Putting this into perspective, this rate is approximately equivalent to the amount of SO₂ emitted by 324,000 heavy-duty diesel trucks, which is the total number of trucks registered in Indiana, Ohio, and Kentucky. (*Id.* at 1-178 to 179.) According to Plaintiffs' expert, Lyle Chinkin ("Chinkin"), the annual excess emissions alone would rank among the top 5% of sources of SO₂ pollution in the Eastern United States. (*Id.* at 1-212.) Cinergy's expert, Stanley Hayes ("Hayes"), testified that the annual excess emissions of SO₂ is equivalent to 2% of SO₂ emissions from all sources of the gas in the State of Indiana. (*Id.* at 3-641.) And, the Wabash River annual excess SO₂ emissions is approximately two times that of the total annual SO₂ emissions from all point sources in all six counties of the Dayton Regional Air Pollution Control Agency. (*Compare id.* at 2-242 with *id.* at 2-321.)

There is no dispute that SO₂ and NO_x emissions contribute to the formation in the atmosphere of secondary particulate matter that is 2.5 microns in diameter or smaller ("PM2.5"), which is called secondary PM2.5. (*Id.* at 1-62 to 64, 1-118, 1-121; Pls.' Ex. 1907, at CINERGY 1005860; Remedy Tr. at 2-234.) Specifically, once emitted, SO₂ can form sulfates, which is a constituent of secondary PM2.5. (Remedy Tr. at 1-64, 1-118, 1-121.) Once emitted, NO_x can form nitrates, which is another constituent of secondary PM2.5. (*Id.*)

In the air, PM2.5 is measured in micrograms per cubic meter ("µg/m³" or "µg"). (*Id.* at 1-122 to 123.) Secondary PM2.5 represents the majority of PM2.5 in the United States. (*Id.* at 1-64.) Secondary PM2.5 can form over hundreds of miles, and it can travel

thousands of miles downwind from where it forms. (*Id.* at 1-77 to 78, 1-141.) Because of its size, PM2.5 is "considered respirable." Pls.' Ex. 1939, at CINERGY 1343912. Once inhaled, PM2.5 lodges deep in the human lung. (Remedy Tr. at 1-63.) Because the sulfate particles tend to combine with metals in the atmosphere, the PM2.5 that contains sulfates are particularly toxic. (*Id.* at 1-80.)

According to Plaintiffs' expert, Dr. Joel Schwartz ("Dr. Schwartz"), the scientific consensus is that PM2.5 is harmful to human health. (*Id.* at 1-63 to 65.) Particulate matter, like PM2.5, cause the following health impacts: decreased lung function, increased prevalence of respiratory symptoms, worsened respiratory infections, heart attacks, and the risk of early death. (*Id.* at 1-49.) The effect on life expectancy and heart attack rates is both acute and chronic. (*Id.* at 1-65 to 70.) These views are held by the following groups in the scientific community: the American Medical Association; EPA's Clean Air Science Advisory Committee ("CASAC"); the American Academy of Pediatrics; the American College of Cardiology; the American Heart Association; the American Thoracic Society; the American Cancer Society; the American Public Health Association; and the National Association of Local Boards of Health (collectively, the "relevant public health advisory groups"). (*Id.* at 1-50 to 54.)

According to the relevant public health advisory groups there is clear and convincing scientific evidence that significant adverse human-health effects occur in response to short-term and chronic particulate matter exposures at and below 15 $\mu\text{g}/\text{m}^3$, the level of the current annual PM2.5 standard. (*Id.* at 1-50 to 54; Pls.' Ex. 1911.) Dr. Schwartz testified that the dose-response curve for PM2.5 and mortality is linear, at least in the range between 8 $\mu\text{g}/\text{m}^3$ and 25 $\mu\text{g}/\text{m}^3$, the range of ambient PM2.5 in the United States.

(Remedy Tr. at 1-85 to 87.) Dr. Schwartz' statistical evidence was acknowledged by a National Academy of Sciences panel, which, after reviewing epidemiology data, stated "For pollutants such as . . . PM2.5 there is no evidence for any departure of linearity in the observed range of exposure." (*Id.* at 4-873 to 877.)

There are some human chamber studies and toxicology studies that argue against a connection between PM2.5 and health effects. (*Id.* at 1-60 to 62, 4-809 to 811, 4-849 to 850.) And, the EPA has stated that it is relevant to consider such studies when evaluating potential mechanisms for PM2.5-related effects. 71 Fed. Reg. at 61,151. However, the reports relied upon by Cinergy's expert, Peter Valberg ("Valberg"), to form his opinion that PM2.5 does not have adverse health effects are a minority view and the bulk of the scientific literature on the subject concludes that PM2.5 has significant effects on human health. (*Id.* at 1-60 to 62, 1-73 to 75.)

Cinergy's reliance on the February 1998 study by the EPA on Hazardous Air Pollutants from Electric Utility Steam Generating Units (the "HAPS report"), is unavailing. (See Defs.' Ex. DR-244.) First, the HAPS report only modeled the effects in a 50-kilometer ("km") radius from the Wabash River plant. (*Id.* at ES-12, 14 to 15.) The primary source of harm from the excess emissions in this case, PM2.5 generated downwind of the Wabash River plant, causes effects beyond the 50-km radius of the report. Second, the HAPS report did not address SO₂, NO_x, PM2.5, or ozone. (*Id.* at ES-27.) The HAPS report recognizes this deficiency as a significant omission. (*Id.*)

Cinergy's reliance on the Toxicology Excellence for Risk Assessment ("TERA") report is equally unavailing. (Defs.' Ex. DR-025.) Like the HAPS report, the TERA report does not address the health impacts or risk from PM2.5. (Remedy Tr. at 4-861 to 867.)

The TERA report does not attempt to measure the health impacts of emissions from Wabash River that has mixed with pollution from other sources or, specifically, the health risks associated with PM_{2.5}. (*Id.* at 4-863, 4-867; McElfresh, Nov. 14, 2008, Dep. at 120, 124.) Furthermore, the efficacy of the TERA report is in question because there is no evidence of the model used by the report authors to form the conclusions contained therein. (McElfresh, Nov. 14, 2008, Dep. at 92-95, 115-16; Defs.' Ex. DR-025, at CINERGY 1547785-87; Remedy Tr. at 4-864 to 867.) In other words, there is no way to test the validity of the air quality model used to form the basis of the conclusions in the report. (Remedy Tr. at 4-864 to 867.)

Plaintiffs' expert, Lyle Chinkin ("Chinkin"), analyzed the extent to which excess SO₂ and NO_x emissions from Wabash River units 2, 3, and 5, contributed to secondary PM_{2.5} formed in the air. (*Id.* at 1-118.) To perform his analysis, Chinkin primarily relied upon two different air quality models, the Community Multi-Scale Air Quality Model ("CMAQ"), and the Comprehensive Air Quality Model with Extensions ("CMAx"). (*Id.* at 1-125, 1-131, 1-133.)

CMAQ is a photochemical grid model that represents the atmospheric science of air pollution in three dimensions. (*Id.* at 1-125.) The atmosphere is simulated in a series of "grid cells," or boxes, over a community. (*Id.*) CMAQ provides an estimate of air pollution concentration in each of the grid cells for PM_{2.5} and ozone. (*Id.* at 1-126.) This model accounts for emissions, atmospheric chemistry, meteorology, and physics. (*Id.* at 1-125 to 129.) CMAQ is one of the most peer-reviewed air quality models and reflects years of scientific testing, experiments, and comparisons of the model's predictions to measured air pollution by air quality monitors. (*Id.* at 1-125 to 126, 1-129 to 130.)

The CMAQ modeling used by Chinkin was derived from "VISTAS," a regional planning organization of Southeastern states that was formed to address air pollution problems. (*Id.* at 1-133 to 134.) In its study, VISTAS modeled the year 2002, including SO₂ and NO_x emissions from multiple sources and the Wabash River plant, to determine both PM2.5 and ozone impacts. (*Id.* at 1-133 to 135.) Peer-reviewed papers concluded that the VISTAS study was reliable. (*Id.* at 1-135 to 136.)

Chinkin used a CMAQ model identical to the VISTAS model, however, he removed the excess emissions of SO₂ and NO_x from the Wabash River plant, as provided to him by Dr. Fox, to determine the impact of the excess emissions on PM2.5 and ozone concentrations. (*Id.* at 1-130, 1-132 to 133, 1-139 to 140.) Chinkin selected June 2002 to model because there were a number of days in that month when air quality exceeded the National Ambient Air Quality Standard ("NAAQS") for PM2.5 and ozone. (*Id.* at 1-138, 1-181 to 182.)

The CMAQ modeling indicated that the excess emissions from the Wabash River plant contributed to PM2.5 levels in Indiana, Ohio, Kentucky, Illinois, Maryland, Rhode Island, New York, Connecticut, and New Jersey. (*Id.* at 1-141, 1-143 to 147.) Specifically, the excess emissions from Wabash River contributed about 0.50 µg of PM2.5 to Indianapolis, Indiana, on half of the days modeled. (*Id.* at 1-206 to 208.) The average monthly impact on PM2.5 ranged from 0.17 to 0.10 µg in Indiana, with smaller impacts in states such as Illinois, Kentucky, Ohio, Michigan, and Wisconsin. (*Id.* at 1-148 to 149.) Chinkin opined that this monthly impact is representative of the likely annual impact on PM2.5 concentration from the excess emissions as confirmed by other modeling and analysis. (*Id.* at 1-138, 1-171 to 173.)

CAMx is another photochemical grid model that Chinkin used to form his opinions. (*Id.* at 1-131.) CAMx is similar to CMAQ in that both models provide estimates of PM2.5 and ozone impacts based on emissions, atmospheric chemistry, and meteorology. (*Id.* at 1-132.) For other purposes, the EPA recently used CAMx to estimate PM2.5 impacts from the emissions from the Wabash River plant in the calendar year 2005. (*Id.* at 1-150 to 152.) The area, or domain, modeled included Indiana, Illinois, Wisconsin, Michigan, Kentucky, and Ohio. (*Id.* at 154.) Chinkin opined that the EPA's CAMx model is reliable and consistent with the EPA's guidelines on good "model performance." (*Id.* at 1-154 to 155.)

Although the CAMx modeling estimated the PM2.5 impact of the entire plant's emissions, approximately one-third of that impact is due to the excess emissions from Wabash River units 2, 3, and 5, because excess SO₂ emissions represent approximately one-third of the total SO₂ emissions from the plant and the relationship between SO₂ and sulfate formation is fairly linear. (*Id.* at 1-152 to 153, 1-177 to 178.) The parties' experts agreed that this proportionality technique was reasonable. (*Id.*; *id.* at 3-631 to 632, 3-633 to 634.)

During the 2005 model year, the greatest daily impacts from the excess emissions on PM2.5 occurred during the summer, when it is hot, humid, and the air is stagnant; these are conditions that are most conducive to conversion of SO₂ to sulfates. (*Id.* at 1-159 to 162.) For example, on June 6, 2005, the excess emissions had about a 0.70 µg impact on the Indianapolis area, with lesser impacts extending to Louisville, Kentucky; Cincinnati-Dayton, Ohio; and Lafayette, Indiana. (*Id.* at 1-159 to 161; Pls.' Ex. 2139.) On August 26, 2005, the highest daily impact of excess emissions on PM2.5 occurred. (Remedy Tr. at 1-

161 to 162; Pls.' Ex. 2139.) On that day, the Wabash River plant had a 6.40 μg impact, one third of which was from excess emissions. (*Id.*) Nonattainment areas impacted that day included Gary, Indiana, and Chicago, Illinois. (*Id.*)

Using the CAMx modeling, the EPA compiled a list of PM_{2.5} nonattainment areas that were most impacted on days when PM_{2.5} concentrations were predicted to be high. (Remedy Tr. at 1-165 to 168.) Those areas included: Evansville, Indiana; Knox County, Indiana; Dubois County, Indiana; Louisville, Kentucky; Marion County, Indiana; Chicago, Illinois; Cincinnati, Ohio; Lafayette, Indiana; Kent, Michigan; McCracken County, Kentucky; Madison, Illinois; St. Louis, Missouri; and Dayton, Ohio. (*Id.*) The average daily impact on those areas ranged from 0.65 μg to 0.19 μg , approximately one-third of which is attributable to excess emissions from Wabash River units 2, 3, and 5. (*Id.*)

The average annual impacts on PM_{2.5} concentrations from the excess emissions from Wabash River units 2, 3, and 5, was predicted by CAMx to be approximately 0.15 to 0.16 μg . (*Id.* at 1-171 to 172.) On an annual basis, the most impacted area was near the Wabash River plant and extending into Indianapolis, with smaller impacts over the states of Illinois, Wisconsin, Michigan, Ohio, and Kentucky. (*Id.*)

The annual impacts predicted by CMAQ and CAMx corroborate one another because their predictions are remarkably similar: annual impact of 0.17 μg predicted by CMAQ compared to an annual impact of 0.16 μg predicted by CAMx. (*Id.* at 1-138, 1-150 to 152; 1-169 to 173.)

Chinkin also analyzed data from a third analytical tool called "CALPUFF." (*Id.* at 1-124 to 125.) CALPUFF is an air quality model that tracks the movement of air pollution from a source, however, it uses simplified chemistry compared to the CMAQ and CAMx

models. (*Id.*) The CALPUFF data that Chinkin considered was performed by the Indiana Department of Environmental Management ("IDEM"), and modeled the emission from the Wabash River plant for its impact on PM_{2.5} concentrations in the year 2003. (*Id.* at 1-174 to 175.) CALPUFF predicted impacts from the Wabash River emissions over all of the Midwest, and into the states of New York, New Jersey, and Connecticut. (*Id.* at 1-175.) The PM_{2.5} concentrations predicted by CALPUFF modeling were smaller than the predictions from the other two models; however, Chinkin attributed this difference to the simplified chemistry of the CALPUFF model. (*Id.* at 1-175 to 176.)

Chinkin opined that the excess emissions from Wabash River units 2, 3, and 5, had a substantial or meaningful impact on the PM_{2.5} concentration in nonattainment areas. (*Id.* at 1-118, 1-194 to 197.) The daily NAAQS for PM_{2.5} is 15 µg, while the annual NAAQS is 35 µg. (62 Fed. Reg. 38,679 (July 18, 1997); 71 Fed. Reg. 61,144, 16,165, 61,171 (Oct. 17, 2006); 62 Fed. Reg. 38,856, 38,895 (July 18, 1997); 73 Fed. Reg. 16,435 (Mar. 27, 2008).) No single source is considered alone when determining whether the PM_{2.5} concentration in any given area exceeds these standards. (Remedy Tr. at 1-197, 3-634 to 637.) When communities are within just a few tenths of a µg from compliance with the annual and/or daily NAAQS, contributions on the order of one-tenth of a µg are significant. (*Id.* at 1-150, 1-173, 2-225 to 226, 2-237 to 239, 2-241.) Therefore, contributions of single sources can make a difference in areas where the difference between attainment and nonattainment is very small. (*Id.* at 2-259.) Dayton, Ohio, is one such area. (*Id.* at 2-225 to 226, 2-238 to 239, 2-241.) There are other such areas in the Eastern United States. (*Id.* at 2-240 to 241.)

Chinkin also opined that continued emissions from the Wabash River plant would have the same impacts in the future. (*Id.* at 1-176.)

2. Ozone

In addition to PM_{2.5}, NO_x contributes to ground level ozone, another secondary pollutant. (*Id.* at 1-91, 1-121.) In the presence of heat and sunlight, NO_x reacts with hydrocarbons—also referred to as volatile organic compounds ("VOCs")—to form ozone. (*Id.*; Pls.' Ex. 1907, at CENERGY 1005842.) In the air, ozone is measure in parts per billion ("ppb"). (Remedy Tr. at 1-123.)

According to Dr. Schwartz, ground-level ozone causes acute inflammation of the lungs, reduction in lung function, increased respiratory symptoms and changes in day-to-day mortality rates; it can trigger asthma attacks; and it can increase hospital admissions for respiratory illnesses. (*Id.* at 1-54 to 55, 1-91 to 92.) Similar to the effects of PM_{2.5}, the scientific consensus is that human health effects from ground-level ozone is linear down to low levels and that any threshold is below current ambient levels. (*Id.* at 1-92 to 93.)

At the excess NO_x emissions calculated by Dr. Fox if SCR was BACT at the time of the projects at Wabash River units 2, 3, and 5, the CMAQ model indicated that the excess emissions contributed to ozone pollution in Indianapolis, Indiana, and further downwind in Ohio. (*Id.* at 1-147 to 148.)

3. Acidic Deposition or Acid Rain

The third type of harm associated with emissions of SO₂ and NO_x is acidic deposition or acid rain. (*Id.* at 1-64, 1-118, 1-121.) As previously discussed, SO₂ is a precursor for

sulfates and NO_x is a precursor for nitrates; sulfates in the form of sulfuric acid and nitrates in the form of nitric acid, are the major components of acid rain. (*Id.* at 2-270 to 271.) Plaintiffs' expert, Dr. Charles Driscoll ("Dr. Driscoll"), testified to the general environmental effects of acid rain. (*Id.* at 2-260 to 302.) Generally, those effects include restricted growth of fauna, decreased ability of fauna to fight diseases and insect infestation, and similar detrimental effects on aquatic ecosystems. (*Id.* at 2-275 to 284.) Dr. Driscoll opined that the general trajectory pattern of the Wabash River emissions, as described by the models used by Chinkin, is very similar to the emissions pattern that other modeling and trajectory studies have reported in the scientific literature about acidic deposition. (*Id.* at 2-272 to 274.) Therefore, Dr. Driscoll opined that the effects of the excess emissions from Wabash River units 2, 3, and 5, would be consistent with those of previously-reported studies. (*Id.*)

Dr. Driscoll stated that the overwhelming consensus among the scientific community is that acidic deposition has cumulative, long-term effects on both forest and aquatic ecosystems. (*Id.* at 2-276 to 277, 2-281, 2-287.) Reductions in acidic deposition can reduce and reverse these adverse effects, however, recovery is very slow. (*Id.* 2-277 to 278, 2-285 to 286.) Dr. Driscoll opined that the greater the extent of acidic deposition reductions, and the sooner such reductions are achieved, the faster the recovery. (*Id.* at 2-277 to 278, 2-287.)

Plaintiffs presented no evidence, however, from which Dr. Driscoll purported to analyze the extent to which any measured acid deposition was attributable to emissions from Wabash River units 2, 3, and 5. (*Id.* at 2-272, 2-300.) Despite having performed environmental quality modeling in the past, Dr. Driscoll did not perform such modeling for the emissions from the Wabash River plant. (*Id.* at 2-272, 2-299 to 300.)

4. Mercury Effects

Plaintiffs' expert, Dr. Driscoll, also testified about the general environmental effects of mercury, which is another byproduct of coal combustion that is emitted from the Wabash River plant. (*Id.* at 2-288 to 298.) Even Cinergy understands that power plants are the largest source of mercury emissions in the United States. (Geers Oct. 24, 2008, Dep. at 27, 35-38, 89-90.)

Mercury is emitted in three forms from a coal-fired power plant like Wabash River: elemental mercury, gaseous oxidized mercury and particulate oxidized mercury. (Remedy Tr. at 2-289 to 290.) Oxidized mercury is deposited generally close to the source, or within 250 miles of the source. (*Id.* at 2-289.) The mercury emitted from the Wabash River plant largely are in the oxidized form. (*Id.* at 2-290.)

Mercury that ends up in the soil undergoes a chemical transformation called methylation. (*Id.* at 2-291.) The formation of "methyl-mercury" is heightened by acid rain, specifically, sulfate deposition. (*Id.* at 2-292.) Methyl-mercury bioaccumulates in food chains and is the form of mercury found in fish. (*Id.* at 2-291 to 292.) Most importantly, the concentration of methyl-mercury goes up by a factor of one to ten million from the time it enters lakes and streams, moves through the food chain, and, finally, accumulates in larger fish consumed by people and animals. (*Id.* at 2-294.)

There is plenty of literature to support Dr. Driscoll's opinion that methyl-mercury deposition has negative effects on the aquatic ecosystem in Indiana and surrounding states. (*Id.* at 2-294 to 297; Pls.' Ex. 1913.) Dr. Driscoll also opined that reduction of mercury emissions from Wabash River would likely result in benefits to Indiana and surrounding areas within a 250-mile radius. (Remedy Tr. at 2-290, 2-297 to 298.)

Wabash River units 2 through 6 emit approximately 170 pounds of mercury per year; units 2, 3, and 5, emit approximately 58 pounds of mercury per year. (*Id.* at 2-351; Pls.' Ex. 2100, at CINREMETREX000917; Docket No. 1499, Stip. of Fact No. 29.) Operation of FGDs and SCRs together can remove from 70% to 80% of the mercury that is otherwise emitted from a coal-fired power plant. (Pls.' Ex. 1912.) An FGD alone would remove from 40% to 60% of the mercury. (Remedy Tr. at 2-391.)

Plaintiffs did not do any modeling or other environmental risk assessment to determine where Wabash River mercury emissions may have been transported or to gauge any impact these emissions may have had. (*Id.* at 1-183, 1-190, 2-300.) Moreover, the EPA's HAP report did study mercury and concluded, generally, that mercury emissions from the utility industry are not expected to have any adverse health effects. (Defs.' Ex. DR-244; Remedy Tr. at 4-826 to 831.)

D. WABASH RIVER COMPLIANCE TODAY

Compliance with NSR today would require installation of BACT at Wabash River units 2, 3, and 5. (Remedy Tr. at 2-329 to 330.) BACT would require a scrubber that removed 99% of the SO₂ and an SCR that would remove 90% of the NO_x from the units' emissions. (*Id.*)

Cinergy, however, through James L. Turner ("Turner"), Duke Energy Corporation's Group Executive and President and Chief Operating Officer of Duke's franchised electric and gas business segment, stated that it would not make sense to install pollution controls on Wabash River units 2, 3, and 5, because they are too old for such modifications to be economical. (*Id.* at 4-679.) Moreover, Turner testified that absent a finding of liability in this

case, Cinergy did not plan to shut down Wabash River units 2, 3, and 5, in the foreseeable future. (*Id.* at 4-679 to 680.) However, as environmental restrictions are likely to become tighter over time, generally, smaller, older units like Wabash River units 2, 3, and 5, "are likely the ones that over time will be shut down." (*Id.* at 2-680.) In fact, in 2007, Cinergy opined that retirement of Wabash River units 2, 3, 4, and 5, around the year 2012 is

an important scenario to consider given the high cost to retrofit these units with pollution control equipment, especially if more stringent environmental regulations are to be enacted. These are the next oldest coal units on Duke Energy Indiana's system . . . and, with more stringent environmental requirements, likely the next units to face retirement.

(Pls.' Ex. 1971, at CINERGY 1407877-78. See also Remedy Tr. at 4-720 to 722.)

Cinergy presented evidence that Midwest ISO ("MISO") has concerns about an immediate shut down of Wabash River units 2, 3, and 5. (Remedy Tr. at 5-957 to 992; Defs.' Ex. DR-321.) Specifically, a MISO representative, Roger Harszy ("Harszy"), MISO Vice President of Real Time Operations, testified that MISO is responsible for the transmission of power in fourteen states across the Midwest, and in the Canadian province of Manitoba. (Remedy Tr. at 5-958.) Upon Plaintiffs' request, MISO undertook an analysis of the potential impact of the immediate shutdown of Wabash River units 2, 3, and 5 ("MISO report"). (*Id.* at 5-960; Defs.' Ex. DR-321.) Based on the analysis in the report, Harszy opined that the immediate unavailability of Wabash River units 2, 3, and 5, would cause a significant problem in MISO's service of the electrical demand in the Terre Haute load pocket. (Remedy Tr. at 5-962.)

Harszy explained that without Wabash River units 2, 3, and 5, to generate power, MISO would use power generated in other parts of Indiana, Illinois, and Michigan, to service the Terre Haute load pocket. (*Id.* at 5-964.) Such a situation would put a strain on

the Dresser transmission substation during the summer peak of electricity demand.¹ (*Id.* at 5-964 to 965.) Transmission of power through the Dresser substation is limited by the transformer equipment at that location. (*Id.* at 5-966.) Without Wabash River units 2, 3, and 5, in operation, coupled with the loss of one of the transformers at Dresser, the Dresser substation could overload and MISO would have to shed load to the Terre Haute region to alleviate the situation. (*Id.* at 5-967 to 968, 5-975 to 976.) If MISO instructs a power supplier to "shed load" it asks the power supplier to turn off the supply of electricity to a certain number of customers. (*Id.* at 5-968.)

Harszy testified that the MISO report recommends two things to alleviate its concerns about the limitation on the Dresser substation: (1) add another transformer to the Dresser substation; and (2) add another 138,000-volt transmission line from Dresser to the Allendale, and Margaret substations. (*Id.* at 5-969 to 970.) Cinergy believes the addition of another transformer at Dresser would alleviate MISO's concerns completely. (*Id.* at 4-690 to 691; Gesweing Nov. 5, 2008, Rule 30(b)(6) Dep. at 108-09.) The addition of another transformer at Dresser has already been planned for by Cinergy and accounted for in models used at MISO, but not in the immediate future. (Remedy Tr. at 5-997, 4-778 to 779.)

Turner testified that on or about January 30, 2009, he authorized his personnel to move forward with the acquisition of a transformer for Dresser, which Turner targeted for installation in June 2012. (*Id.*) Cinergy stated that it would take approximately two years

¹For purposes of the MISO study and this Order, the summer peak of electricity demand is defined as days of ninety-degrees or higher in the Terre Haute area. (Remedy Tr. at 5-974 to 975.)

to obtain a transformer of the appropriate size for Dresser. (Geswein Nov. 5, 2008, Rule 30(b)(6) Dep. at 109.) In addition, Cinergy generally keeps a spare transformer of the size needed at Dresser in the system. (*Id.*) Turner testified that Cinergy has already planned to use its only spare transformer to replace a more critical failure in the Cincinnati, Ohio, area. (Remedy Tr. at 4-692 to 694, 4-767 to 678, 4-772.) Turner also testified that Cinergy could have a the new transmission line in place by September 2012. (*Id.* at 4-695 to 696.)

Harszy stated that if MISO knew for certain that Wabash River units 2, 3, and 5, were going to go offline; or if there were some catastrophe that would take Wabash River units 2, 3, and 5, offline; or if Cinergy had approached MISO and asked it to study such a scenario, MISO would have performed an Attachment Y study,² and it would have worked with Cinergy to formulate a plan to alleviate the concerns identified in the MISO study. (Remedy Tr. at 5-972 to 974, 5-989 to 990.)

²An "Attachment Y study" is a detailed engineering analysis of different transmission and capacity scenarios that MISO would perform if a power plant owner told MISO that the power plant owner intended to shut down a generating unit. (Remedy Tr. at 5-970, 5-971.) The MISO report is not an Attachment Y study. (*Id.* at 5-960, 5-970, 5-973.)

E. THE SO₂ CAP-and-TRADE PROGRAM

Since 1995, under the acid rain cap-and-trade program, total SO₂ emissions from certain coal-fired electric generating units have been capped at 8.9 million tons. 42 U.S.C. § 7651b(a)(1). In part, the purpose of the SO₂ cap-and-trade program is to achieve "reductions in annual emissions of sulfur dioxide of 10 million tons from 1980 emission levels." *Id.* § 7651(b). Within the SO₂ cap-and-trade program, the EPA has allocated SO₂ allowances to utilities; each allowance constitutes authorization to emit one ton of SO₂ for the specified year. *Id.* § 7651b(a)(1); *id.* § 7651a(3). (See also Remedy Tr. at 3-445 to 448.) Utilities may purchase needed allowances to cover their actual emissions or sell extra allowances so long as they do not emit more SO₂ in total than the amount for which they have allowances. 42 U.S.C. § 7651b(b); 40 C.F.R. § 73. (See also Remedy Tr. at 3-446, 4-698 to 700.) In addition, if a company reduces emissions at one facility by putting on controls, for example, the utility can sell those allowances to other utilities, or use them in another part of its system. (Remedy Tr. at 3-445 to 446, 4-700.) Cinergy has always operated within its cap. (*Id.* at 4-698, 4-704.)

The SO₂ allowance allocation for the Wabash River plant is approximately 12,000 allowances per year. (*Id.* at 3-475.) If Wabash River units 2, 3, and 5, are shut down, they will no longer emit SO₂, but Cinergy will retain those allowances for use elsewhere in its system. (*id.* at 3-446, 3-475 to 476, 4-698 to 699.)

F. VIOLATIONS AT BECKJORD

By Order dated September 28, 2007 ("Beckjord Order"), this Court concluded that Cinergy exceeded limits established for particulate matter ("PM") emissions at its Beckjord facility in violation of both an Administrative Consent Order ("AOC"),³ a settlement contract that Cinergy Corp. had entered into with the Environmental Protection Agency ("EPA"), which was effective for the years 1998 through 2000; and an Ohio State Implementation Plan ("Ohio SIP"), a permit and statutory obligation of Cincinnati Gas & Electric Company. Docket No. 984, at 2. Specifically, the Court found that Cinergy exceeded PM emissions limits on October 12, 1999; October 21-22, 1999; May 4, 2000; and May 26, 2000. *Id.* In addition, the Court concluded that Plaintiffs could hold each party liable under the two sets of obligations because, in essence, the duties thereunder were separate. *Id.* at 4-5. Since the Beckjord Order issued, the parties have stipulated that the various defendant entities are jointly responsible for any penalty imposed for the Beckjord violations. Docket No. 1499, at No. 24.

The Ohio SIP limit for PM emissions from Beckjord units 1 and 2 was 0.1 pounds per million BTU. (Remedy Tr. at 2-415.)

PM emissions at Beckjord units 1 and 2 are controlled by devices known as electrostatic precipitators ("ESPs") that were installed on those units in or about 1974. (Boots Oct. 16, 2008, Dep. at 67-68; Boots Nov. 24, 2008, Rule 30(b)(6) Dep. at 150, 152-54.) However, the Beckjord units have no PM emissions continuous monitoring equipment;

³The Court notes that the AOC was reached in response to an enforcement action brought by EPA for a March 27, 1997, PM emissions test failure at unit 1. (Remedy Tr. at 2-414.) In conjunction with the AOC settlement, Cinergy paid a \$63,000.00 penalty. (*id.* at 2-417 to 418.)

rather, compliance is measured through periodic stack tests known as Method 5 tests. (Remedy Tr. at 5-1034 to 1035.) Method 5 tests are based on averaging three hours of data and are only performed periodically. (*Id.* at 5-1042 to 1043.)

The failed emissions test at Beckjord unit 2 in October 1999, was associated with a test burn of alternative fuel, which was a mixture of coal and paper pellets. (*Id.* at 5-1008.) This was the only time that Beckjord unit 2 burned this alternative fuel. (*Id.*)

The parties agree that as a result of the PM emissions tests failure of October 12, 1999; May 4, 2000; and May 26, 2000; unit 1 was not in compliance for twenty-three days. (*Id.* at 2-416 to 417; Defs.' Ex. DR-333.) The parties also agree that as a result of the PM emissions test failures of October 21 and 22, 1999, unit 2 was not in compliance for two days. (Remedy Tr. at 2-418 to 419; Defs.' Ex. DR-333.) At the time of these violations, the statutory maximum penalty was \$27,500.00 per day per violation. (Remedy Tr. at 2-417.)

After each emissions test failure, Cinergy promptly removed the unit from service, hired an inspector, and made the changes and/or repairs to the ESPs that the inspector recommended. (*Id.* at 5-1000 to 1004.)

Plaintiffs presented evidence at the remedy phase trial about additional PM emissions test failures at Beckjord not addressed by the Beckjord Order. Beckjord unit 1 failed another PM emissions test in October, 2003. (*Id.* at 5-1004.) In addition, Beckjord unit 2 failed a PM emissions test in April 2006. (Boots Oct. 16, 2008, Dep. at 68.)

After the unit 1, October 2003, failure, Cinergy looked to a different consultant to systematically identify the problems associated with the ESP on unit 1. (Remedy Tr. at 5-1004 to 1007.) Cinergy hired NELS Consulting Services to do a full evaluation of the ESP on unit 1. (*Id.* at 5-1005.) NELS performed a gas flow evaluation at that time and

concluded that it could significantly reduce the emission rate of the ESP through better distribution of the gas flow through the precipitator. (Pls.' Ex. 2054, at CINERGY1404615.) Specifically, NELS recommended improvements in the vertical distribution of the air flow through the precipitator. (*Id.* at 1323469.) According to NELS, a 1972 Research-Cottrell study had suggested to Cinergy that horizontal flow through the precipitator was excellent, however, vertical distribution was poor. (*Id.* at CINERGY1323472.) As a result of the poor vertical distribution of gas in the ESP, gas only hit the top portion of the precipitator. (Remedy Tr. at 5-1019 to 1020.) NELS designed a set of baffles and vanes to alleviate this problem; Cinergy installed the baffles and vanes in May 2004. (*Id.* at 5-1006 to 1007.) There have been no stack test failures at Beckjord unit 1 since installation of the baffles and vanes. (*Id.* at 5-1007.)

Beckjord unit 2 failed a PM emissions test in April 2006. (*Id.* at 5-1009.) In or about February 2007, Cinergy installed the baffle and vane system in the unit 2 ESP that it had installed in unit 1 in May 2004. (*Id.*)

The parties agree that PM continuous emissions monitors ("PM CEMS") should and could be installed on Beckjord units 1 and 2. (*Id.* at 5-1045 to 1046, 5-1086.) Such monitors have been installed on a number of coal-fired units. (*Id.* at 5-1046.) Currently, the EPA has approved the use of PM CEMS to determine compliance with PM limits for coal-fired utilities, at the source's option. (*Id.* at 5-1047.) However, PM CEMS have a high "error band," meaning they are more susceptible to erroneous readings than other forms of testing. (*Id.* at 5-1035, 5-1037 to 1040.)

Cinergy's expert, Richard McRanie ("McRanie"), testified that averaging time is a key component in any emissions limit. (*Id.* at 5-1043.) "A longer averaging time enables you

to squish the error out of measurement and arrive at the truth." (*Id.*) Although the EPA recommends a 24-hour averaging time, McRanie testified that if PM CEMS were used as a compliance measurement tool at Beckjord units 1 and 2, a 30-day averaging time would be sufficient to "squash the error out." (*Id.* at 5-1043 to 1044.)

II. DISCUSSION & LEGAL CONCLUSIONS

The Court has addressed the available remedies in this case in at least four orders. See Docket Nos. 647, 984, 1440, 1524. It is with that backdrop that the Court concludes the following.

A. REMEDIES FOR VIOLATION OF THE CAA AT WABASH RIVER

On November 1, 2005, this Court concluded that 28 U.S.C. § 2462 barred Plaintiffs' claims for civil penalties for violations of the CAA. In so concluding, the Court declined Plaintiffs' invitation to revisit this Court's decision in *United States of America v. Southern Indiana Gas & Electric Co.*, No. IP 9901692-C-M/F, 2002 WL 1760752 (S.D. Ind. July 26, 2002) ("*SIGECO*"), in which it held that a violation of the CAA's preconstruction permit regulations is complete at the time the construction project is completed. *Id.* at *8. However, in the November 1, 2005, Order the Court declined Cinergy's invitation to apply the statute of limitations in 28 U.S.C. § 2462 to bar Plaintiffs' claims for equitable relief because the equitable relief sought by Plaintiffs was merely compensation for the injury caused by Cinergy's violation of the CAA and was not a penalty. Docket No. 647, at 8-9. This ruling implied that injunctive relief in the form of mitigation or remediation for past harm caused by the violation would be available.

The Court clarified its view on this issue by Order dated October 14, 2008. See *United States v. Cinergy Corp.*, 582 F. Supp. 2d 1055 (S.D. Ind. 2008) (cited to herein as *Cinergy II*; referred to herein as "Scope of Remedies Order"). Relying upon *Porter v. Warner Holding Co.*, 328 U.S. 395 (1946), and its progeny, the Court concluded that the remedy provision of the CAA applicable to Cinergy's NSR violations at Wabash River did not limit the Court's equitable power to provide remedies for past violations. *Cinergy II*, 582 F. Supp. 2d, at 1060-62. Specifically, the Court stated:

[I]n this case an order requiring [Cinergy] to take actions that remedy, mitigate, and offset harms caused to the public and the environment by [its] past CAA violations would seem to give effect to the CAA's purpose "to protect and enhance the quality of the Nation's air resources so as to promote the public health and welfare." 42 U.S.C. § 7401 (emphasis added). See also 42 U.S.C. § 7470 (stating the purpose of the PSD program is "to protect public health and welfare from any actual or potential adverse effect . . . from air pollution"). This Court therefore concludes that its equitable authority granted by [42 U.S.C. § 7413(b)] includes the authority to order relief aimed at redressing the harms caused by [Cinergy's] established violations of the CAA. In other words, this Court's equitable authority is not limited to providing prospective relief only.

Id. at 1061-62.

In addition, the Court concluded that any ruling on the propriety of any retroactive mitigation remedy at that time was premature:

This Court has indicated that a significant delay between a violation and [Plaintiffs'] filing suit may be relevant in determining whether to grant injunctive relief or other equitable relief at all. Such a delay may also be relevant in determining the extent of such relief to be awarded. A determination on these questions awaits the presentation of evidence and factual development at trial, however.

Id. at 1066.

By Order dated January 7, 2009, the Court confirmed that traditional principles of equity would apply to the Court's consideration of the appropriate injunctive relief in this

case. Docket No. 1524. The Court concluded that *Weinberger v. Romero-Barcelo*, 456 U.S. 305 (1982), compelled the Court to weigh the equities rather than conclude that the Jury's finding of a violation automatically entitled Plaintiffs to injunctive relief. Docket No. 1524, at 9. See also *Sierra Club v. Franklin County Power of Ill., LLC*, 546 F.3d 918, 935-36 (discussing the application of traditional injunctive relief analysis after *eBay Inc. v. MercExchange, L.L.C.*, 547 U.S. 388 (2006), to a citizen suit under the CAA). Therefore, to determine the appropriate relief for Cinergy's violations of the CAA at Beckjord, the Court will consider (1) whether Plaintiffs have suffered an irreparable injury; (2) whether there are inadequate remedies available at law to compensate for the injury; (3) whether, considering the balance of hardships between Plaintiffs and Cinergy, a remedy in equity is warranted; and (4) whether a permanent injunction would not disserve the public interest. *eBay*, 547 U.S. at 391.

Plaintiffs contend that a multiple-part remedy is warranted for Cinergy's violation of the NSR provisions of the CAA for the projects at Wabash River Units 2, 3, and 5. Specifically, Plaintiffs argue for (1) the immediate shutdown of Wabash River units 2, 3, and 5; and (2) mitigation of the excess emissions from Wabash River units 2, 3, and 5, by (a) installation of BACT on Wabash River units 4 and 6 (or retirement of unit 4); and (b) over a twenty-year period, surrender of SO₂ allowances corresponding to the total SO₂ excess emissions. Plaintiffs assert that they have shown significant and irreparable harm to the environment from emissions from Wabash River units 2, 3, and 5. The irreparable harm includes significant PM_{2.5} effects that extend throughout the Midwest and into the Eastern states of New York, New Jersey and Connecticut; ground-level ozone effects in the same regions; acid rain deposition effects in the forested areas of the Midwest; and mercury

effects within a 250-mile area of the Wabash River plant. Although closure of Wabash River units 2, 3, and 5, would have an immediate positive impact on the health effects from those emissions, Plaintiffs argue that the "Court should . . . craft mitigation that confers the maximum environmental benefit related to the kind and degree of the harm from the violations." (Pls.' Proposed Concl. of Law, at 36 (citing *United States v. Deaton*, 332 F.3d 698, 714 (4th Cir. 2003)).) Thus, Plaintiffs argue, additional future reductions in the same airshed are necessary to balance out the pollution that Cinergy never would have emitted if it had followed the law. (*Id.* at 32.) In addition, Plaintiffs suggest that the Court order Cinergy to surrender SO₂ allowances in an amount equal to the total SO₂ excess emissions, with the total allowance surrender coming prior to 2029, to ensure that reductions taken at Wabash River units 4 and 6, do not result in increased emissions elsewhere. (*Id.* at 38.) According to Plaintiffs, "This ensures the best possible nexus between the violations and the remedy." (*Id.*)

Cinergy asserts that, if the Court concludes that Plaintiffs have established irreparable harm, it agrees with Plaintiffs that retirement of units 2, 3, and 5, is an appropriate remedy. However, Cinergy contends that the most equitable remedy is for Cinergy to retire the units in 2012. In addition, until retirement of the units, Cinergy proposes to operate units 2, 3, and 5, at a rate approximately equivalent to the pre-project emissions levels, or the Rosen baseline levels. Cinergy argues that this solution provides the best balance of harms, keeping in mind the public interest.

Moreover, Cinergy contends that Plaintiffs' proposed remedial measures have an insufficient nexus to Cinergy's violation of the NSR provisions of the CAA. Cinergy asserts that the SO₂ allowance program is separate and apart from its obligations under the NSR

provisions and one should not be used to remedy the other. (Cinergy Proposed Findings of Fact & Concl. of Law, at 65-67.) In addition, because Plaintiffs have dropped their claims against Cinergy for any violations at Wabash River units 4 and 6, Cinergy avers that Plaintiffs should not be allowed to achieve through mitigation what they chose not pursue in court. In other words, there is no nexus between the Jury's findings that Cinergy violated the NSR on projects at Wabash River units 2, 3, and 5, and pollution controls on Wabash River units 4, and 6. (*Id.* at 66-67.) Furthermore, Cinergy argues that to the extent that it should have to mitigate any "excess emissions," retirement of units 2, 3, and 5, will accomplish that task; any attempt to put controls on units 4 and 6 (with combined, yearly emissions nearly double that of units 2, 3, and 5, collectively), exceeds the scope of the violations. (*Id.* at 67.)

1. Plaintiffs Proved Irreparable Injury & Inadequate Remedies at Law

At the outset, the Court must note that it declines Cinergy's invitation to decide on the appropriate remedy in a piecemeal fashion. Throughout the remedy phase Cinergy separately analyzed the prospective remedy of shutdown of Wabash River units 2, 3, and 5, from the mitigation remedy of controls on Wabash River units 4, and 6, coupled with surrender of SO₂ allowances equivalent to the excess emissions from Wabash River units 2, 3, and 5, from the date of the projects to the present. Cinergy fails to recognize that the appropriateness of each of these remedies depend upon Plaintiffs' showing of an irreparable injury and an inadequate remedy at law, as well as the balance of harms, including the public interest, weighing in Plaintiffs' favor. The proof is the same; the

question is whether the equities warrant all of the relief Plaintiffs request if they proved the first two elements.

That being said, the Court concludes that the evidence of environmental harm from non-permitted SO₂ emissions and, to a lesser extent, NO_x emissions, from Wabash River units 2, 3, and 5, from the date of the project through 2007, compels a finding of irreparable injury for which there is no adequate remedy at law. There is no dispute that the Jury in this matter concluded that Cinergy violated the NSR provisions of the CAA when it unreasonably failed to expect a net increase of 40 tons or more of either SO₂ and/or NO_x emissions as a proximate result of the refurbishment projects at Wabash River units 2, 3, and 5.

The Court was persuaded by Plaintiffs' expert, Dr. Fox, that at the time of the Wabash River projects, LAER for SO₂ control was an FGD with a 95% removal efficiency. (Remedy Tr. at 2-307.) Cinergy presented little and unpersuasive evidence to contradict Dr. Fox that an FGD with a 95% removal efficiency was running at a coal-fired generating unit in the United States at the time of the projects with reportedly good, if not great, success. (*Id.* at 2-318 to 319.) In addition, there was published literature on the subject and the manufacturer of the unit that was already running had applied for a patent for an FGD with a 99% removal efficiency. (*Id.* at 2-319 to 320.) As such, the Court can only conclude that LAER for SO₂ removal at the time of the projects was, at a minimum, an FGD with a removal efficiency of 95%.

Rarick's assertion that Cinergy would have applied for a synthetic minor permit cap for SO₂ emissions instead of installing LAER at the time of the Wabash River projects is not credible. Not only had another coal-fired plant installed an FGD at the time of the projects,

there is no evidence that Cinergy had ever or has ever obtained a synthetic minor permit for any coal-fired unit. (Pearl Oct. 30, 2008, Rule 30(b)(6) Dep. at 60.) Cinergy admitted that such permits were much more common for combustion turbine units that operate only during periods of peak energy demand. (*Id.* at 60-61.) As Pearl testified, coal-fired units, such as Wabash River units 2, 3, and 5, are "base-load units" that Cinergy would "want . . . available to operate at all times, so [it is] much more hesitant to restrict their operation," as would be required by a synthetic minor permit. (*Id.* at 61.) Pearl's testimony is consistent with Cinergy's reasons for undertaking the Wabash River projects in the first place—life extension of the base-load units. For these reasons, the Court concludes that it is unlikely that Cinergy would have sought a synthetic minor permit cap for SO₂ emissions at Wabash River units 2, 3, and 5, at the time of the projects.

The Court has concluded that LAER for SO₂ at the time of the Wabash River units 2, 3, and 5, projects was an FGD with an SO₂ removal efficiency of 95%. The Court also concludes that Dr. Fox's method for calculating the excess emissions for SO₂ as a result of the projects most accurately reflects the intent of the NSR to measure emissions permit compliance on an annual basis. Therefore, the Court concludes that the excess SO₂ emissions caused by the projects at Wabash River units 2, 3, and 5, total 359,000 tons, in the time period from the date of the projects through 2007.

However, the Court was persuaded by Cinergy's experts, Rarick and DePriest, that BACT for NO_x was a low-NO_x burner, not an SCR. At the time of the projects, the uncontested fact is that no SCR had been installed on a coal-fired generating unit in the United States. (Remedy Tr. at 2-325 to 326, 4-889.) Moreover, there was evidence that

SCRs on coal-fired units in Europe and Japan had run into problems when using high-sulfur coals, coal more similar to that available in the United States. (*Id.* at 2-403, 4-559 to 569.)

In addition, the EPA rule-making comments in June 1991 indicate that even at that time SCR was not used in the United States. (*Id.* at 4-887 to 888, 4-890.) In that publication, the EPA recommended low-NO_x burners as BACT for NO_x emissions control. (*Id.*) Although never promulgated into a rule, the EPA's comments are strong evidence that BACT in 1989 and 1990 for NO_x emissions was low-NO_x burners, not SCR.

Cinergy installed low-NO_x burners that would meet an emissions limitation of 0.6 pounds per million BTU on unit 5 at the time of that project. (*Id.* at 4-889.) Cinergy installed a similar low-NO_x burner on unit 3 a few years after the modification to that unit that is at issue in this case. (*Id.* at 4-889.) Even with these installations, Cinergy's excess emissions of NO_x totaled 4,865 tons, through 2009. (*Id.* at 5-946 to 947.)

Like Plaintiffs' expert, Dr. Fox, Cinergy's expert, Rarick, opined that at the time of the projects, installation of BACT for NO_x emissions would have been the most reasonable presumption for how Cinergy would have applied for a permit at the time of the projects on Wabash River units 3 and 5. (*Id.* at 5-947 to 948.) The Court has no reason to doubt this conclusion and hereby adopts it.

Given the Court's conclusion that Cinergy's failure to apply for permits and install LAER for SO₂ emissions control, and BACT for NO_x emissions control at the time of the Wabash River units 2, 3, and 5, projects, resulted in 359,000 tons of excess SO₂

emissions⁴ and 4,865 tons of excess NO_x emissions,⁵ the Court now turns to Plaintiffs' proof of irreparable harm caused by these excess emissions.

The Court is persuaded by Plaintiffs' experts, Dr. Schwartz and Chinkin, that secondary PM_{2.5} formed in the air from emissions of SO₂ and, to a lesser extent, NO_x, from the Wabash River plant has a significant impact on human health in Indiana, Illinois, Wisconsin, Michigan, Ohio, and Kentucky. (*Id.* at 1-141 to 149, 1-138, 1-171 to 173.)

This is evidenced by the relatively high concentrations of secondary PM_{2.5} in those areas as predicted by Chinkin's CMAQ and CAMx models. (*Id.*) Although those predicted levels do not by themselves approach the NAAQS, they are significant because the NAAQS is a regional standard that measures the PM_{2.5} total from all sources within the region. (*Id.* at 1-118, 1-194 to 197, 3-634 to 637.) The Court found credible Chinkin's statement that the annual excess emissions from Wabash River units 2, 3, and 5, alone would rank among the top 5% of sources of SO₂ pollution in the Eastern United States and would have a substantial and meaningful impact on the PM_{2.5} concentration in nonattainment areas. (Remedy Tr. at 1-212, 1-118, 1-194 to 197.) Hayes, one of Cinergy's experts, testified that the annual excess emissions of SO₂ is equivalent to the SO₂ emissions from all other sources of the gas in the State of Indiana. (*Id.* at 3-641.) And, the Wabash River annual excess SO₂ emissions is approximately two times that of the total annual SO₂ emissions from all point sources in all six counties of the Dayton

⁴These excess emissions were calculated by Plaintiffs' expert, Dr. Fox, from the date of the projects through 2007. (Remedy Tr. at 2-230 to 231.)

⁵These excess emissions were testified to by Cinergy's expert, Rarick, from the date of the projects through 2009. (*Id.* at 5-946 to 947.)

Regional Air Pollution Control Agency, which is in a nonattainment area within the relevant geography of the Wabash River plant. (*Id.* at 2-242 & 2-321.) Reductions in secondary PM_{2.5} of the magnitude of that contributed by the annual excess emissions from Wabash River Units 2, 3, and 5, could effect the nonattainment status of several communities including Dayton, Ohio. (*Id.* at 2-225.) These opinions and figures, that the Court adopts, evidence that Cinergy's un-permitted emissions are quantitatively significant. The measurable secondary PM_{2.5} from emissions at the Wabash River plant extend as far as New York, New Jersey and Connecticut. (*Id.* at 1-141, 1-143 to 147.) Although the effects in these states are less severe than the effects closer to the Wabash River plant, any reduction in PM_{2.5} formation could impact a region's attainment status. (*Id.* at 2-259.)

The relevant public health advisory groups agree that PM_{2.5} causes decreased lung function, increased prevalence of respiratory symptoms, worsened respiratory infections, heart attacks, and early death. (*Id.* at 1-49 to 54.) These same groups conclude that there is clear and convincing scientific evidence that significant adverse human-health effects occur in response to exposures to PM_{2.5} at and below the 15 µg/m³ of the current annual PM_{2.5} NAAQS. (*Id.* at 1-50 to 54; Pls.' Ex. 1911.) Because the relationship between the dose-response curve for PM_{2.5} and mortality is linear, any reduction in PM_{2.5} concentration would have a corresponding reduction in mortality rate. (Remedy Tr. at 1-50 to 54, 1-85 to 87. See also *id.* at 4-873 to 877.)

The Court was not persuaded by Cinergy's expert that the HAPS report and TERA report indicate that SO₂ and NO_x emissions have no adverse health effects for the reasons stated in the Factual Background section of this Order. Cinergy also argues that Plaintiffs' data is not particularized enough to warrant a finding that excess emissions from Wabash

River had significant detrimental environmental effects because the PM_{2.5} CMAQ and CMAx model numbers are small compared to the NAAQS. But, as stated earlier, the NAAQS is not the standard against which a single source is measured. Rather, the NAAQS is a regional limit for PM_{2.5} from all sources within that region. (*Id.* at 1-197, 3-634 to 637.) The uncontroverted evidence is that the annual SO₂ excess emissions from Wabash River units 2, 3, and 5, not only exceed the 40-ton threshold in the NSR provisions of the CAA, those excess emissions alone could be ranked in the top 5% of all contributors to the NAAQS in the Eastern United States. (*Id.* at 1-212.) By any measure, the negative effects from such pollution is significant.

The Court also rejects Cinergy's argument that there can be no excess SO₂ emissions because it always stayed within its limits under the SO₂ cap and trade program. Cinergy's obligations under the cap and trade program are separate from its responsibilities under the NSR program. The purpose of the NSR is to ensure that older facilities that undergo certain major modifications are brought within tighter emissions standards. 42 U.S.C. § 7470. Cinergy is required to meet this obligation whether or not it can continue to meet its obligations under the cap and trade program. The responsibility under NSR is not fungible like Cinergy's allowances under the cap and trade program. In other words, Cinergy cannot escape responsibility for operating Wabash River units 2, 3, and 5, without a proper permit as required by the NSR provisions of the CAA because another provision of the CAA allows it to look at its total emissions under a regional cap. For this Court to so hold would render the NSR provisions superfluous.

Although the Court did not agree with Plaintiffs assertion that Cinergy's excess NO_x emissions were in the tens of thousands, Cinergy still emitted excess NO_x. Therefore, the

Court concludes that such excess NO_x emissions would cause a negative effect with respect to ground level ozone, but not the effects testified to by Chinkin as predicted by the CMAQ and CAMx models.

With respect to Plaintiffs' proof of acidic deposition impacts and mercury impacts, the Court concludes that Plaintiffs did not provide sufficient nexus between the relevant excess emissions and the negative environmental and health effects to support a conclusion of irreparable harm.

In summary, the Court concludes that Plaintiffs have proven that the excess SO₂ and NO_x emissions from Wabash River units 2, 3, and 5, had significant health and environmental effects in the form of PM_{2.5} in the states of Indiana, Illinois, Wisconsin, Michigan, Ohio, and Kentucky. Such health and environmental effects are irreparable and there is no adequate remedy at law.

**2. Equity Demands Shutdown of Wabash River Units 2, 3, and 5,
No Later Than September 30, 2009 & Surrender of Certain Allowances**

The Court concludes that the balance of harms weighs heavily in favor of a relatively immediate shutdown of Cinergy's Wabash River units 2, 3, and 5. When it enacted the NSR provisions of the CAA, Congress struck a balance in favor of pollution controls on units for which a major modification was expected to result in an increase in net emissions of 40 tons or more of either SO₂ or NO_x. 42 U.S.C. §§ 7475(a), 7479(3), 7502(c)(5), 7503, 7411(a)(4), 7477. Cinergy was aware of this legislation before it undertook the Wabash River units 2, 3, and 5, projects. See *United States v. Cinergy Corp.*, 495 F. Supp. 2d 892, 908-09 (S.D. Ind. 2007). There is no doubt that Cinergy has benefitted from its decision

to proceed with its life extension projects without installing pollution controls on Wabash River units 2, 3, and 5: it obtained an additional approximately twenty years of service from these "base-load" coal-fired units. (Pls.' Ex. 1955, at PSI 0083177, PSI 0083172; Pls.' Ex. 1319, at CINWA002121-22; Remedy Tr. at 2-271 to 272, 2-300 to 3-02, 2-306, 2-315 to 317.)

Moreover, despite a finding of liability for the Wabash River units 2, 3, and 5, projects by the Jury on May 22, 2008, Cinergy took no action to determine the consequences that a decision to close those units would have on the Terre Haute load pocket, or on the broader region. The evidence is clear that Cinergy had already determined by that time that installation of pollution control technology on those units was not economical. Earlier in May 2008, Turner submitted testimony to the IURC that Cinergy would consider closure of the older units, like Wabash River units 2, 3, and 5, as tighter clean air restrictions were implemented. (Pls.' Ex. 1971, at CINERGY 1407877-78; Remedy Tr. at 4-720 to 722.) Likewise, at trial, Turner testified that Cinergy has ruled out controlling those units. (Remedy Tr. at 4-679 to 680, 4-730.) Yet, after a finding of liability under the NSR with respect to the Wabash River units and knowing that the alternative was to apply for the necessary permits or shut down the units, Cinergy did nothing. It did not curtail its emissions from Wabash River units 2, 3, and 5; it did not request an Attachment Y study from MISO to have answers for the Court at the remedy phase trial about the consequences of a decision to immediately shut down those units.

By its actions, Cinergy has indicated to the Court a failure to respect the balance struck by Congress in the NSR and less than due regard for the dispute resolution process presided over by this Court. Cinergy's apparent inability to appreciate the relevance of the

regulatory scheme and the Jury's verdict was made plain by Turner's testimony. Turner testified that shortly after the Jury rendered its verdict in May 2008, he learned that the remedy Plaintiffs sought was either installation of pollution controls or immediate shutdown of Wabash River units 2, 3, and 5. (Turner, Nov. 11, 2008, Dep. at 195; Remedy Tr. at 4-739.) But, the following dialog took place during Turner's deposition on November 11, 2008, in preparation for the remedy phase trial:

Q. Okay. In your mind is the shutdown of Units 2, 3 and 5 before 2012 a possibility as a result of this litigation?

* * *

A. – that I think are [sic] not acceptable.

Q. Okay. . . . And what steps, in your view, has Duke taken to address the possibility that Units 2, 3 and 5 could be shut down before 2012 as a result of a court order?

A. At this point we are, I guess for lack of a better way to say it, we're not planning for that to happen. If the Court tells us otherwise, we'll have to change our plans.

Q. Okay. An how, in your view, does that show that Duke has acted prudently with regard to reliability if it has not done any planning yet for the possibility of Units 2, 3 and 5 being shut down before 2012?

[A.] Well, I think we're being prudent in every way that we're looking at the remedy phase of this case and that the remedy we have proposed is the most prudent. I'm hoping we are not ordered to do something that I think would be less prudent than – than the remedy or the – the – the offer that we've made in this case, but if we're ordered to do something other than the prudent remedy that we've carved out here or we've proposed, we will quickly assess plans and – and shift gears.

* * *

Q. Okay. I mean, why haven't you assessed the – the reliability impacts of shutting down before 2012?

* * *

[A.] I – I think we have a sense of the reliability impacts of shutting down before 2012. I don't know that we've done – I don't know what kind of detailed studies you're looking for, but I think we have an understanding of it as I believe the MISO witness testified as well, and in addition to that we believe, you know, it makes sense to wait until Edwardsport comes on line.

(Turner, Nov. 11, 2008, Dep. at 249-50.) Similarly, at the remedy phase trial Turner testified that at the time Cinergy's answers to interrogatories were filed on October 8, 2008, Cinergy did not contact MISO to request any kind of reliability study connected to the closure of Wabash River units 2, 3, and 5. (Remedy Tr. at 4-729.) Specifically, Turner testified:

A ... We would not have asked MISO in 2008 to conduct that study for a 2012 shutdown.

Q Because you decided 2012 was the right date for the shutdown, right?

A I decided it was the most appropriate remedy.

(*Id.* at 4-729.)

Cinergy's move in December 2008 to curtail its emissions from Wabash River units 2, 3, and 5, in 2009 comes too late to mitigate the consequences of the Jury's and the Court's conclusion that Cinergy has failed to appreciate the significance of its decision to ignore the balance struck by Congress in the NSR provisions of the CAA. Cinergy has emitted several hundred thousand tons of excess emissions since the date of the projects and, even faced with a Jury verdict against it, Cinergy did nothing to account for its actions except propose a plan in its own best interests and one that comports closely to its own business plan. All of these factors weigh in favor of immediate shut down of Wabash River 2, 3, and 5.

The Court is mindful, however, that the MISO report raises some legitimate reliability concerns if Wabash River units 2, 3, and 5, are immediately shut down. However, the evidence supports a conclusion that Cinergy has been aware of the need to upgrade the Dresser substation by installing a third transformer because it had planned to supply power through that station from its new Edwardsport, Indiana, plant. (Remedy Tr. at 4-662, 4-674, 4-686, 4-690 to 692.) Moreover, the MISO report indicates that MISO's reliability concerns are greatest for the summer months when temperatures are likely to exceed 90 degrees Fahrenheit. (Defs.' Ex. DR 321, at CINERGY 1665224, CINERGY 1665229; Remedy Tr. at 5-967.) The Court must take these concerns seriously because reliability of electricity in the Terre Haute load pocket could impact the public. Taking this into account in the balance, allowing Cinergy to run Wabash River units 2, 3, and 5, at the Rosen baseline levels, which is where Turner currently ordered them to be run, through the summer months of 2009, but no longer, would allow Cinergy and MISO time to perform a full-blown Attachment Y study; and would allow Cinergy to make alternative plans to make upgrades to the Dresser substation.

In addition, the Court concludes that surrender of SO₂ emission allowances approximately equal to amount of SO₂ excess emissions from Wabash River units 2, 3, and 5, in the period from May 22, 2008, to September 30, 2009, as an additional remediation measure is appropriate. The Court considers three factors when it evaluates remediation measures: (1) whether the measure "would confer maximum environmental benefits;" (2) whether the measure is "achievable as a practical matter;" and (3) whether the measure bears "an equitable relationship to the degree and kind of wrong it is intended to remedy."

United States v. Deaton, 332 F.3d 698, 714 (4th Cir. 2003) (quoting *United States v. Cumberland Farms of Conn., Inc.*, 826 F.2d 1151, 1164 (1st Cir. 1987)).

Under Plaintiffs' remedy proposal, the surrender of SO₂ emission allowances was tied to their mitigation proposal that the Court require Cinergy to install BACT on units 4 and 6, to further reduce the emissions in the Wabash River region and to ensure that Cinergy does not benefit from installation of pollution control technology on those units. The Court agrees with Cinergy that Plaintiffs' mitigation proposal does not bear an equitable relationship to the degree and kind of harm it is intended to remedy. There is no dispute that Wabash River units 4 and 6 have combined emissions that are twice that of units 2, 3, and 5, combined. (Remedy Tr. at 1-177 to 178, 3-632.) For the Court to order Cinergy to install pollution control technology on those units would far exceed any mitigation remedy justified by Plaintiffs evidence of irreparable harm. Plaintiffs have not proven that Cinergy violated any CAA provisions with respect to units 4 and 6. Therefore, it is the Court's view that imposition of such a remedy is punitive in nature and the Court has already determined that such remedy is not available to Plaintiffs for Cinergy's violations of the NSR for the projects at Wabash River units 2, 3, and 5. Thus, any surrender of SO₂ allowances that is tied to installation of pollution controls on units 4 and 6 is also a penalty without sufficient nexus to the violation to be considered mitigation.

On the other hand, by closing Wabash River units 2, 3, and 5, in the relatively near future, Plaintiffs and the public will enjoy a significant reduction in SO₂ and NO_x emissions in the region. The Court's remedy will require Cinergy to retire units 2, 3, and 5, at least three years sooner than it would have otherwise, and likely more years earlier given Turner's testimony that absent this law suit, Cinergy did not plan to shut down those units.

(Remedy Tr. at 4-675.) This is a significant step toward remediation by itself. However, surrender of SO₂ allowances tied to excess emissions from Wabash River units 2, 3, and 5, for the time period after the Jury determined liability and until September 30, 2009, the date upon which the Court has ordered herein for shutdown to occur, would further confer an environmental benefit to the region, and bears an equitable relationship to the degree of harm it is designed to remedy. Permanent surrender of SO₂ allowances confers an environmental benefit to the region that has been harmed by the over 350,000 tons of excess SO₂ emissions from Wabash River units 2, 3, and 5, over the past twenty years. Such a surrender would mitigate, in part, the excess emissions from Wabash River 2, 3, and 5, in the year 2008, and mitigate the excess emissions from those units in some fraction of the previous years. Moreover, despite Cinergy's protestations otherwise, surrender of allowances has been used in other cases as part of consent decrees in suits by the EPA against power plant owners. See, e.g., *United States v. Am. Elec. Power Serv. Corp.*, Consent Decree, at ¶¶ 70-84, 91-99 (available at epa.gov/compliance/resources/decrees/civil/caa/americanelectricpower-cd.pdf). Because such a surrender is tied to the facility and units for which Plaintiffs have proven Cinergy liable, there is, as coined by Plaintiffs, an "elegant nexus" between the surrender of this specific number of allowances and the harm caused by Cinergy's SO₂ excess emissions from Wabash River units 2, 3, and 5.

The fact that Plaintiffs waited until 1999 to file this law suit does not change the Court's conclusion that shut down of Wabash River units 2, 3, and 5, should come as soon as possible rather than on Cinergy's time table or that surrender of some SO₂ allowances is equitable. The Court recognizes that Plaintiffs claims were filed approximately ten years

after the projects at issue. However, this fact cannot render insignificant Cinergy's decision to perform life-extension projects at its older units without making any kind of prediction of the potential for increased emissions from those units as required by the NSR provisions of the CAA. Cinergy has benefitted from nearly twenty years of additional service from Wabash River units 2, 3, and 5; Plaintiffs' delay in filing suit does not outweigh the seriousness of Cinergy's NSR violations.

Finally, although the Court considered the public interest when it decided the appropriate time table for the shutdown of Wabash River units 2, 3, and 5, the Court will briefly address Cinergy's argument that the cost of Plaintiffs' proposed remedy will affect its ratepayers. The Court recognizes that any remedy that does not coincide with Cinergy's business plan will adversely affect Cinergy's bottom line. In addition, it is possible that for certain types of remedies, Cinergy may be allowed to petition the Indiana Utility Regulatory Commission for rate changes to pay for those remedies. In these difficult economic times, the Court cannot ignore those possibilities. However, the Court also cannot ignore the Jury's verdict that Cinergy violated the NSR when it did not seek a permit or take action to install LAER for SO₂ emissions controls and BACT for NO_x emissions controls at the time of the Wabash River units 2, 3, and 5, projects. Plaintiffs have proven irreparable harm to human health and the environment as a result of Cinergy's violations. The Court's remedy attempts to balance the need to redress the harm caused by Cinergy's violation with both Cinergy and its ratepayer's needs to control costs and is significantly less onerous than the remedy proposed by Plaintiffs.

In summary, for its violation of the NSR provisions of the CAA for its four projects at Wabash River units 2, 3, and 5, as found by the Jury in this matter on May 22, 2008, the

Court concludes that the equities weigh in favor of an injunction. The following injunctive relief is appropriate:

1. Cinergy shall shut down Wabash River units 2, 3, and 5, no later than September 30, 2009;
2. Cinergy shall run Wabash River units 2, 3, and 5, at a rate that does not exceed the Rosen baseline emissions until the time it shuts down those units; unless Cinergy can show the Court good cause for running those units above said baseline; and
3. Cinergy shall surrender, permanently, SO₂ emission allowances in an amount approximately equal to the amount of SO₂ emissions from Wabash River units 2, 3, and 5, from the period beginning on May 22, 2008, through shut down of those units on September 30, 2009.

B. REMEDIES FOR PM VIOLATIONS AT BECKJORD

Plaintiffs contend that the appropriate remedy for Cinergy's four violations at Beckjord units 1 and 2 is for Cinergy to install a PM CEMS as a compliance measurement tool, with a 30-day averaging time. Plaintiffs argue that this remedy comports with the EPA's standard to use any credible evidence to determine whether a source is in violation of permitted limits. See 40 C.F.R. § 52.12(c). In addition, Plaintiffs assert that the appropriate penalty for the Beckjord PM violations is the statutory maximum penalty of \$1.32 million. Plaintiffs calculated this amount by adding (a) the product of the statutory maximum penalty of \$27,500.00 per day times twenty-three days, the number of days that Cinergy Corp. violated the AOC; to (b) the product of the statutory maximum penalty of \$27,500.00 per day times twenty-five, the number of days that Cincinnati Gas & Electric violated the Ohio SIP. (Pls.' Proposed Concl. of Law, at 49.) Plaintiffs argue that such a penalty comports with the purposes of the penalty provisions of the CAA, which include

retribution, deterrence, and restitution. See *Tull v. United States*, 481 U.S. 412, 422 (1987). Plaintiffs contend that none of the evidence adduced at trial warrants a reduction from the maximum penalty.

Cinergy asserts that the maximum penalty is not warranted because of its good faith efforts to comply with its permit obligations. Specifically, Cinergy argues that as soon as it became aware of each violation it shut down the unit, hired inspectors, and implemented the repairs and/or changes recommended by the outside inspector. In addition, Cinergy spent considerable time and money assessing the appropriate modifications to the ESPs and implemented those changes. Since making those changes, Cinergy argues, there have been no PM violations at Beckjord. In addition, Cinergy avers that by addressing the problems quickly, the seriousness of the violations was minimized. In total, Cinergy contends that the factors weigh against application of the maximum penalty. Furthermore, Cinergy argues that Plaintiffs seek a double penalty for identical violations of the Ohio SIP and the AOC at Beckjord unit 1. The parties have now stipulated that the various Cinergy entities are jointly responsible for any penalty assessed for violations at Beckjord; therefore, Cinergy asserts that there is no reasonable justification for a double penalty.

According to the Seventh Circuit, when considering fines under the CAA, the Court should "generally presume that the maximum penalty should be imposed." *United States v. B&W Inv. Props.*, 38 F.3d 362, 368 (7th Cir. 1994). However, the Court

shall take into consideration (in addition to such other factors as justice may require) the size of the business, the economic impact of the penalty on the business, the violator's full compliance history and good faith efforts to comply, the duration of the violation as established by any credible evidence (including evidence other than the applicable test method), payment by the violator of penalties previously assessed for the same violation, the economic benefit of noncompliance, and the seriousness of the violation.

42 U.S.C. § 7413(e)(1). The Court has considerable discretion to determine the proper weight for each factor. *B&W Inv. Props.*, 38 F.3d at 368. Furthermore, a penalty may be assessed for each day of violation. 42 U.S.C. § 7413(e)(2).

The Court concludes that the statutory maximum penalty should apply to Cinergy's violation of the Ohio SIP, but additional recovery under the AOC would not serve the interests of justice in this case. Despite Cinergy's avowal that it made good faith efforts to ensure that its ESPs on Beckjord units 1 and 2 worked properly, and to make necessary upgrades of the equipment to improve air flow through the unit to improve results, it took Cinergy four years to implement the key change in vertical airflow to the ESP on unit 1. Although the 1972 study that suggested that vertical airflow was a problem is not conclusive, a history of successive failures in 1999 and 2000 at unit 1 should have prompted Cinergy to delve deeper into the problems with the ESPs. Moreover, after discovering the vertical airflow problem on the unit 1 ESP in late 2003, Cinergy waited until unit 2 failed another test in April 2006 to consider making the necessary vertical airflow adjustments to the ESP on unit 2. In fact, Cinergy waited until February 2007 to implement such improvements on the unit 2 ESP.

Although Cinergy contends that its prompt actions once it learned of a violation reduces the seriousness of the violation, such a view fails to consider that Method 5 is not a continuous monitoring measurement. Rather, it is a spot-check of the average of three hours worth of emissions. Such a method does not account for the potential that Cinergy violated the Ohio SIP at other times during which no test was performed.

The Court notes that Cinergy's violations at unit 2 in 1999 could have been caused by its test burn of an alternative fuel. There is no evidence, however, that Cinergy alerted

any regulatory authority about its test burn or negotiated any kind of permit variance during the test burn that would have mitigated the seriousness of a two-day violation.

The Court is not convinced, however, that penalizing the individual defendants under each of the agreements is just given the parties' stipulation that all of the Cinergy defendant entities are jointly liable for the PM violations at Beckjord units 1 and 2. As Plaintiffs point out, the purposes of the CAA penalty provisions include retribution, deterrence, and restitution. See *Tull*, 481 U.S. at 422. Requiring the Cinergy entities to pay the maximum daily penalty for all violations under the Ohio SIP serves all of these purposes.

Turning now to the appropriate injunctive relief, the parties largely agree that the Court should require Cinergy to install PM CEMS on Beckjord units 1 and 2 for continuous emissions monitoring. The Court agrees that the evidence presented at the remedy phase trial supports a conclusion that continuous emissions monitoring is an appropriate remedy for Cinergy's violations of the Ohio SIP and the AOC. There is little doubt that the harm caused by violation of emissions limits is irreparable, and the Court so concludes. In addition, monetary penalties cannot deter completely the harm caused by Cinergy's multiple violations of emissions limits. As a result, continuous emissions monitoring like that provided by PM CEMS is a logical remedy to ensure that Cinergy complies with the Ohio SIP. The Court notes, however, that using a PM CEMS as a compliance measurement tool on a daily basis is inappropriate given the evidence that the device has a high error band. The Court found this evidence credible. Pursuant to these findings, the Court concludes that the use of the PM CEMS on Beckjord units 1 and 2 for compliance purposes is appropriate only if the averaging time is thirty days. (Remedy Tr. at 5-1043 to 1044.)

In summary, the Court concludes that Cinergy must pay the maximum statutory penalty of \$27,500.00 per day, for twenty-five days of violation of the Ohio SIP; the interests of justice make an additional penalty under the AOC excessive. In addition, Cinergy shall be required to install a PM CEMS for continuous PM emissions monitoring on Beckjord units 1 and 2. The PM CEMS devices shall be used for compliance purposes only if a thirty-day averaging time is used.

III. CONCLUSION & ORDER

For the reasons stated herein, the Court **ORDERS** the following:

As the remedy for defendants', Cinergy Corp., PSI Energy, Inc., and the Cincinnati Gas & Electric Company, violation of the New Source Review provisions of the Clean Air Act as found by the Jury on May 22, 2008, for the following projects: (1) the front wall radiant superheater replacement project at Wabash River, Indiana, unit 2 from June 1989 to July 1989; (2) the high temperature finishing superheater tubes and upper reheater tubing assemblies replacement project at Wabash River, Indiana, unit 2 from May 1992 to September 1992; (3) the finishing, intermediate, and radiant superheater tubes and upper reheat tube bundles replacement project at Wabash River, Indiana, unit 3 from June 1989 to October 1989; and (4) the boiler pass and heat recovery actions replacement project at Wabash River, Indiana, unit 5 from February 1990 to May 1990; defendants, Cinergy Corp., PSI Energy, Inc., and the Cincinnati Gas & Electric Company, **SHALL:**

1. Shut down Wabash River units 2, 3, and 5, no later than September 30, 2009;
2. Run Wabash River units 2, 3, and 5, at a rate that does not exceed the Rosen baseline emissions until the time said units are shut down;

unless defendants can show the Court good cause for running those units above said baseline; and

3. Surrender, permanently, SO₂ emission allowances in an amount approximately equal to the amount of SO₂ emissions from Wabash River units 2, 3, and 5, from the period beginning on May 22, 2008, through shut down of those units on September 30, 2009.

As the remedy for defendants', Cinergy Corp., PSI Energy, Inc., and the Cincinnati Gas & Electric Company, violation of the Ohio State Implementation Plan particulate matter emissions limits at Beckjord units 1 and 2 on October 12, 1999; October 21-22, 1999; May 4, 2000; and May 26, 2000; as concluded by the Court by Order dated September 28, 2007, defendants, Cinergy Corp., PSI Energy, Inc., and the Cincinnati Gas & Electric Company, **SHALL:**

1. Pay to plaintiffs, the United States of America, and plaintiff-intervenors, the States of New York, New Jersey and Connecticut, and the Hoosier Environmental Council and the Ohio Environmental Council, a penalty in the total amount of \$687,500.00;

2. Install a particulate matter continuous emissions monitor on Beckjord units 1 and 2 as soon as practical. Said particulate matter continuous emissions monitors shall be used for compliance purposes only if a thirty-day averaging time is used.

There being no just reason for delay, the Court shall enter partial final judgment on plaintiffs, the United States of America, and plaintiff-intervenors', the States of New York, New Jersey and Connecticut, and the Hoosier Environmental Council and the Ohio Environmental Council, claims that defendants, Cinergy Corp., PSI Energy, Inc., and the Cincinnati Gas & Electric Company, violated the New Source Review provisions of the Clean Air Act with respect to the projects on Wabash River unit 2, 3, and 5, as finally resolved herein.

IT IS SO ORDERED this 29th day of May, 2009.

LARRY J. McKINNEY, JUDGE
United States District Court
Southern District of Indiana

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LEGAL PUBLICATIONS

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- "The Americans with Disabilities Act's Impact on
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