BEFORE THE ENVIRONMENTAL REVIEW APPEALS COMMISSION
STATE OF OHIO

KAREN ARNETT	:	
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APPELLANT,	:	
	:	
V.	:	CASE NO. ERAC 315205
	:	
CHRISTOPHER JONES, DIRECTOR	:	
OHIO ENVIRONMENTAL PROTECTION, ET AL.	:	
	:	
APPELLEES.	:	ISSUED: AUGUST 5, 2004

FINDINGS OF FACT, CONCLUSIONS OF LAW AND FINAL ORDER

THE ENVIRONMENTAL REVIEW APPEALS COMMISSION:

Julianna F. Bull, Chair
Toni E. Mulrane, Vice-Chair
Melissa M. Shilling, Member

Telephone: 1/614/466-8950

COUNSEL FOR APPELLANT:

Richard C. Sahli, Esq.
5483 Runnymede Lane
Columbus, Ohio 43228

COUNSEL FOR APPELLEE:

Brett A. Kravitz, Esq.
Yanna Robson Higgins, Esq.
Assistant Attorneys General
Environmental Enforcement Section
30 E. Broad Street - 25th Floor
Columbus, Ohio 43215

COUNSEL FOR APPELLEE
UNIVERSITY OF CINCINNATI:

David E. Northrop, Esq.
Katerina M. Eftimoff, Esq.
PORTER, WRIGHT, MORRIS &
ARTHUR LLP
41 South High Street
Columbus, Ohio 43215

This matter comes before the Environmental Review Appeals Commission ("ERAC," "Commission") upon the September 13, 2002 Notice of Appeal filed by Appellant Karen Arnett. The action underlying the instant appeal is the Director of the Ohio Environmental Protection Agency's August 15, 2002 issuance of a Final Air Permit To Install ("PTI") to the University of Cincinnati for a project at its Central Utility Plant involving the installation of two natural gas and fuel oil fired combined-cycle turbines with duct burners.

On October 14 -16, 20, and 21, 2003, the Commission conducted a *de novo* hearing on the merits of Appellant's appeal. Appellant Arnett is represented by Mr. Richard Sahli, Esq., Columbus, Ohio. Appellee Christopher Jones, Director of the Ohio Environmental Protection Agency ("Director," "OEPA," "Agency") is represented by Assistant Attorneys General Mr. Brett A. Kravitz, Esq. and Ms. Yanna Robson Higgins, Esq.. Representing Appellee University of Cincinnati ("University," "UC") are Mr. David E. Northup, Esq. and Ms. Katerina Eftimoff, Esq. of the law firm of Porter, Wright, Morris & Arthur, LLP, Columbus, Ohio.

Based upon the evidence adduced at the *de novo* hearing and the relevant statutes, regulations and case law, as well as Certified Record Items Numbers 1 and 2[1], which the Commission *sua sponte* admits into evidence, the Commission hereby makes the following Findings of Fact, Conclusions of Law and Final Order affirming the Director's issuance of a PTI to Appellee University.

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[1] Certified Record Item Number 1 is the Final PTI issued to the University of Cincinnati by OEPA. Certified Record Item Number 2 is the entire application submitted to OEPA by the University. Though portions of the application were admitted as evidence, the Commission, for purposes of clarity, determined it necessary to *sua sponte* admit these documents.

FINDINGS OF FACT

Overview

1. The federal Clean Air Act ("CAA") establishes a comprehensive statutory framework for the protection of air quality standards throughout the nation. Towards that end, the CAA delimits specific responsibilities for the federal and state governments. The United States Environmental Protection Agency ("USEPA") implements the federal component and is charged with defining pollutants to be regulated and setting goals for air quality throughout the nation. The USEPA is also responsible, *inter alia*, for establishing uniform technology-based standards for significant new sources, standards for new and existing sources of hazardous air pollutants, and standards for mobile sources. States and local governments are imparted the "primary responsibility" of regulating "air pollution control at its source." (Section 101 of the CAA.)

2. The CAA requires states to develop State Implementation Plans ("SIPS") that provide for the implementation, maintenance, and enforcement of National Ambient Air Quality Standards[2] ("NAAQS") promulgated by USEPA. (Section 110 of the CAA.) At the time of the University's application, the USEPA had established NAAQS for six criteria pollutants: particulate matter (PM_{10}), sulfur dioxide (SO_2); nitrogen dioxide (NO_2 or "NOx"); carbon monoxide (CO); volatile organic compounds (VOC) and lead (Pb). (40 C.F.R. 50)

3. Part C of the CAA codifies a program designed to prevent significant deterioration of air quality in areas of the country where the air quality is already cleaner than the pollutant concentration thresholds established by NAAQS. (Section 160 and 161 of the CAA.) The

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[2] The CAA authorizes the establishment of NAAQS for criteria pollutants that USEPA has deemed to cause or contribute to air pollution. The primary NAAQS are health related and the secondary NAAQs are welfare related. (Section 109 of the CAA.)

Prevention of Significant Deterioration ("PSD") program requires that a potential air contaminate source obtain a PSD permit prior to the commencement of "construction[3]" of a "major emitting facility[4]" in an area designated in attainment for one or more NAAQS pollutant emitted by the facility. (Section 160 through 169 of the CAA.) A "modification" means any "physical change in, or change in the method of operation, of a stationary source which increases the amount of air pollutant emitted by the source or which results in the emission of any air pollutant not previously emitted." (Section 111 of the CAA.) Thus, the PSD program applies to major stationary sources and major modifications of existing sources, if the modification increases the amount of actual emissions.

4. If the proposed emissions for the source trigger PSD review, the permittee must employ Best Available Control Technology ("BACT") to control each regulated pollutant. In determining what constitutes BACT, both OEPA and USEPA prefer applicants to apply, what is generally referred to as a "top-down BACT" analysis. This process, in effect, eliminates available technologies on energy, environmental, and economic bases, until the BACT for any given project remains for implementation. (Testimony M. Hopkins.)

5. Ohio's federally-approved PSD program is codified in Ohio Administrative Code ("OAC") Chapter 3745-31. (*66 Fed. Reg. 51570* (Oct. 10, 2001) 66 Fed. Reg. 2909 (Jan. 22, 2003).)

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[3] "Construction," when used in conjunction with any source or facility, includes modifications to that source or facility. (Section 169 of the CAA.)

[4] For the purposes of this appeal, a "major emitting facility" or "major stationary source," is any source emitting, or having the potential to emit, 250 tons per year or more of "any air pollutant." (Section 169 of the CAA.)

The Application

6. The University is a public university in the State of Ohio. Its campuses within the City of Cincinnati consist of eighty-six buildings located on approximately 190 acres. (Testimony of S. Leesman.)

7. On February 26, 2001, the University submitted to the Agency, a PTI application proposing the installation of two natural gas and fuel oil fired combined-cycle turbines with duct burners possessing a NOx emissions limit of 25 ppm to be located at its Central Utility Plant. (Certified Record ("CR") Item 2.)

8. Mr. Steven Leesman, Assistant Vice President in the Department of Administrative and Business Services at UC, testified regarding the University's project at issue. In 1993, the University constructed a new Central Utility Plant ("CUP") on its Clifton Campus. The CUP contains a natural gas and oil fired boiler, which provides heat and electricity to the University. Once the CUP became operational, the University removed four coal-fired boilers previously used by the University to provide heat and electricity for the campus. The CUP alone is unable to meet the electrical needs of the University. Currently, the University purchases additional electricity from Cinergy, the local utility, to meet its electrical demands. (Testimony S. Leesman.)

9. To reduce its reliance on Cinergy, the University decided to expand the CUP by installing additional electric and heat generating equipment. On-site generation of heat and electricity produces lower cost and more reliable resources for the University's medical, research, and teaching facilities, than the electricity currently being procured from Cinergy. Mr. Leesman also noted that the electric efficiency of the fossil-fueled power plants operated by Cinergy is 30% to 35%, while the system proposed by the University would achieve electric efficiency of 50% to 70%. Thus, Mr. Leesman asserted, the system proposed by the University would be more

environmentally responsible, as it could produce electricity more efficiently than the electricity generated by Cinergy. (Testimony of S. Leesman.)

10. Because the project was classified as a "modification," of an existing source, the University was required to apply for a PTI from the OEPA. At the University's request, Environmental Quality Management ("EQM"), an environmental consulting firm, prepared the University's PTI application for the turbine project. Ms. Dawn Miller, a chemical engineer and registered professional engineer for EQM, assembled a team of senior professionals and environmental specialists, all of whom have experience in assessing environmental air quality issues, to assist in the permitting process. The senior professionals on the project have worked in air pollution dispersion modeling, BACT determinations, and related areas pertaining to air pollution permitting. Ms. Miller has worked on air permits for EQM for approximately ten years. (Testimony of D. Miller; UC Ex. 11.)

11. The University's application reflects that it selected two 14.5 megawatt (MW) natural gas and fuel oil fired combined-cycle combustion turbines, model type Titan 130, manufactured by Solar Turbines, Inc.. The turbines are designed to generate electricity while the exhaust gas from the turbines is heated by duct burners and channeled to heat recovery steam generators ("HRSG's"). A portion of the steam produced will be ducted to steam turbines which will generate additional electricity. Another portion of the steam will be used to heat campus buildings. This process is commonly referred to as "cogeneration" of heat and power. (Testimony of S. Leesman, D. Miller; CR Item 2.)

12. Titan 130 turbines are designed to use natural gas as the primary fuel and transportation grade, low sulfur fuel oil as the backup fuel. The permit limits the use of backup fuel to not more

that 228 hours per year per turbine. (PTI, CR Item 1; CR Item 2.)

13. After detailing the scope and location of the CUP expansion project, the University's permit application sets forth an overview of applicable state and federal regulations. It first reviews the federal ambient air quality criteria for pollutants considered harmful to public health and the environment, or NAAQS, set by the USEPA Office of Air Quality Planning and Standards. (40 C.F.R. 50.) Air dispersion models contained in the application demonstrate that emissions of NOx, CO, VOC, and PM_{10} from the proposed source would not cause or contribute to the violation of ambient air quality standards and would not exceed the increments[5] allotted to Ohio under the CAA. (Testimony of D. Miller; CR Item 2.)

14. Second, the application classifies the project's status under the federal PSD program and concludes that the facility is subject to PSD review, as it met three regulatory criteria for PSD applicability: (1) the project is a major stationary source or major modification; (2) the new major source or modification will be located in a PSD attainment[6] area for all criteria pollutants; and, (3) the proposed pollutant emissions or emission increases are considered significant under PSD rules. (40 CFR 52.21.)

15. Third, the application notes that federal non-attainment New Source Review requirements

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[5] Increments are allowed increases, consistent with the PSD program, in the concentration of criteria pollutants emitted by the source under review. (Testimony of M. Hopkins).

[6] The Hamilton County area was redesignated in September 2001 as nonattainment for VOCs. However, following redesignation, VOC emissions did not trigger a nonattainment new source review, since the potential VOC emissions were less than the major source threshold of 100 tons per year. (Testimony of B. Miller.) Further, USEPA issued a NOx waiver recognizing that NOx emissions were not contributing to ozone problems in the Hamilton County area. Thus, OEPA continued to treat NOx as an in attainment pollutant under the PSD program. (Testimony of T. Keener, State Ex. 19.)

are inapplicable, because the project is located in an attainment area for all pollutants[7]. (40 C.F.R. 52.24; CR Item 2.)

16. Fourth, the application reviews the New Source Performance Standards[8] ("NSPS") for stationary gas turbines (40 C.F.R. 60, Subpart GG) and indicates that the project's emissions rates are well-below the federal standards. Therefore, NSPS standards are inapplicable. (CR Item 2.)

17. Fifth, the application states that no regulations promulgated under the National Emission Standards for Hazardous Air Pollutants[9] ("NESHAP") are applicable to this project. (40 C.F.R. 61 and 63; CR Item 2.)

18. Sixth, finding that the proposed project will meet all criteria outlined in the exemption to the Federal Acid Rain Program[10], 40 C.F.R. 72.6(b)(4)(ii), the application states that the project is

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[7] Dr. Timothy Keener, Professor of Civil and Environmental Engineering at the University, testified on UC's behalf regarding the CUP expansion project and its associated PTI application. Dr. Keener recently participated in a study regarding the formation of atmospheric ozone in Hamilton County. He testified that the study's results supported the findings of USEPA by concluding that NOx emissions were not contributing to ozone problems in the Hamilton County area; that the granting of a NOx waiver was appropriate; and that an "attainment" designation for Hamilton County was proper. (Testimony T. Keener.)

[8] The NSPS establishes emission levels for major new sources or modifications of existing sources and requires permits for the construction and operation of stationary gas turbines. Standards of performance are listed for each of the major source categories. (See Section 111 of the CAA.)

[9] The NESHAP establishes regulations for stationary sources of air pollution that emit certain toxic air pollutants in designated industrial categories. The standards relate primarily to activities such as metal coating (asbestos), rocket motor firing (Be), and battery manufacture and sludge processing (Hg). (See Section 112 of the CAA.)

[10] The Federal Acid Rain Program targets sulfur dioxide and nitrogen oxides to reduce the adverse effects of acid deposition. The goal of the 1990 CAA Amendment was to reduce SO_2 emissions by 10 million tons per year and NOx emissions by 2 million tons per year from 1980 levels. In doing so, this program sets out an emissions trading system of marketable allowances. (Sections 401 through 416 of the CAA.)

exempt from the requirements of that program. (CR Item 2.)

19. Seventh, the application states that because the University's project triggers the federal PSD program, it is subject to the state of Ohio PSD rules regarding New Source Review, promulgated in OAC Chapter 3745-31. (CR Item 2.)

20. Ohio EPA employees, Mike Hopkins, Brad Miller, and Alan Lloyd conducted a preliminary completeness review of the PTI application. A preliminary completeness review is a cursory inspection of the application wherein OEPA employees make note of any missing documents and additional information necessary to commence a more comprehensive review. As part of the preliminary completeness review process, on March 6, 2001, OEPA requested documentation substantiating UC's claim that the 25ppm NOx limit per turbine was appropriate for the proposed gas turbines. (Testimony of B. Miller; State Ex. 6.) The University's response on March 29, 2001, provided documentation of two similar cogeneration turbine projects with NOx emission limits of 25 ppm, along with emissions data and guarantees from the turbine manufacturer. (Testimony of B. Miller; State Ex. 7.) Ohio EPA accepted this additional information as adequate support for the 25 ppm emission limits proposed in UC's project. (Testimony of B. Miller; State Ex. 21; UC Ex. 17.)

21. Following discussions with both OEPA and the local air authority, the Hamilton County Department of Environmental Services ("HCDES"), UC revised its application twice. The first revision was in response to a July 30, 2001, letter from Gregory Howard, Environmental Compliance Specialist for HCDES, in which he informed the University that based on recent USEPA guidance, CO controls were considered to be cost effective within the range of $5166 per ton of CO removed, as cited in the University's application. Therefore, "[i]n order to comply with

BACT requirement, add-on control at least as effective as CO oxidation catalyst, must be used" at the facility. (State Ex. 8.) On September 6, 2001, the University submitted the first revision of its application indicating that it would install CO oxidation catalyst controls, a control process designed to reduce the emissions of VOC and CO. (State Ex. 9).

22. On April 6, 2002, the University submitted the second and final revision of its application. This revision was prompted by discussions between OEPA and the University in which both concluded that PM_{10} emissions would be greater than originally projected and would be considered significant under PSD rules. (Testimony A. Lloyd.)

23. Ultimately, the University submitted an application, which contained a BACT analysis for CO, VOC, PM_{10} and NOx, demonstrating that appropriate control technologies had been selected for each pollutant. (Testimony of D. Miller and A. Lloyd; State Ex. 9, 10, 11, 21; UC Ex. 12.)

24. Both OEPA and HCDES reviewed the University's application. Upon completing its review, HCDES forwarded its comments to OEPA's central office. Ohio EPA employees, Alan Lloyd and Brad Miller, then prepared a Staff Draft Action Determination ("Staff Determination"), containing the Agency's preliminary review and findings regarding UC's PTI application. The Staff Determination document concluded that "based upon analysis of the permit to install application and it's (*sic*) supporting documentation provided by UC, the Ohio EPA staff has determined that the proposed increase" in emissions "will comply with all applicable state and federal environmental regulations and that the requirements for BACT are satisfied" for all regulated pollutants. "Therefore, the Ohio EPA staff recommends that a permit to install be issued to UC." (Testimony of A. Lloyd, State Ex. 21.)

25. On May 2, 2002, simultaneous with the release of the Staff Determination, the Director

of OEPA issued a draft PTI to the University. On May 4, 2002, OEPA provided public notice of the draft permit inviting public comment and contemporaneously issued a notice for a public hearing, which was held on June 12, 2002. (Testimony of B. Miller; State Ex. 15 and 16.) Appellant Arnett attended the public hearing and provided testimony relative to the BACT analysis for NOx removal as described in the University's application for the CUP expansion. (Testimony of K. Arnett.) Though not legally required to do so, the Director researched issues raised during the public hearing and, prior to the issuance of the permit, prepared responses to most of these issues, including an explanation of the BACT analysis contained in the application. (Ohio Revised Code Chapter 3704; State's Ex.19.)

26. On August 15, 2002, the Director issued a final Permit To Install to the University for its turbine project. (CR Item 1.)

Karen Arnett

27. Appellant Karen Arnett resides in Mt. Healthy, approximately six miles from the facility. At the time of filing this appeal, however, she resided approximately one mile from the CUP. Appellant still frequents the University area for socializing, shopping, and recreation[11]. (Testimony of K. Arnett.)

28. Appellant Arnett's appeal alleges the following three assignments of error:

> (1) The director erred and/or abused his discretion in allowing an incomplete and unlawful BACT analysis to be conducted by his staff.

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[11] In its Answer, Appellee University asserted, as an affirmative defense, that Appellant Arnett lacks standing, because she was "neither aggrieved nor adversely affected by the Director's action." Though not addressed during the *de novo* hearing, the Commission finds adequate testimony to support that Appellant Arnett does, in fact, possess standing. While she no longer resides near the facility, she testified that she frequents the area for socializing, shopping and recreation. (Testimony K. Arnett; ERAC Case File C)

(2) The director erred and/or abused his discretion in issuing the PTI despite an incomplete BACT analysis.

(3) The permittee acted unlawfully and unreasonably by not complying with its duty under law, to conduct a proper BACT analysis for NOx.
(Notice of Appeal, ERAC Case File A.)

29. Appellant is a member of the Environmental Community Organization (ECO), an environmental advocacy group located in the Cincinnati area. Ms. Arnett testified that she considers the appeal to be a project of her organization. (Testimony K. Arnett.)

30. Appellant acknowledges limited technical expertise on the substantive areas surrounding this appeal, but is concerned about the air quality in the Cincinnati area. As such, to pursue this appeal, she relies on the interpretation and testimony of Walter Koucky, who was hired by ECO to provide expert testimony on behalf of the Appellant in the instant matter. (Testimony of K. Arnett.)

31. At the *de novo* hearing, the Commission qualified Mr. Koucky as an expert in general emissions control technology. In 1984, he received a Masters in Environmental Science in Air Pollution Control from the University of Cincinnati, College of Engineering. Admittedly not a specialist in turbine technology, he does, however, possess over twenty years experience in environmental planning, modeling, permitting, monitoring, compliance and research pertaining to air quality matters. (Testimony of W. Koucky.)

BACT Analysis & OEPA

32. In the instant appeal, Appellant Arnett does not object to the BACT determinations for PM_{10}, VOC, and CO. Appellant Arnett does, however, object to the BACT determination for NOx removal. Specifically, the crux of Appellant's claim lies in her opposition to the BACT analysis for

NOx performed by UC, and ultimately approved by OEPA, which lead to the selection of dry low NOx ("DLN") burners as BACT for UC's turbine project. (Testimony of W. Koucky.)

33. Both OEPA and the University employed the five step top-down BACT analysis, as recommended in the Draft New Source Review Workshop Manual ("Draft NSR Manual") prepared by USEPA. Released in October 1990, and never issued as a final document, the Draft NSR Manual is the most widely-used source of information on how to perform a top-down BACT analysis. (Testimony of M. Hopkins, D. Miller, W. Koucky.) While not mandated, both USEPA and the Agency prefer that an applicant perform the top-down BACT analysis delineated in the Draft NSR Manual. Although OEPA does not require PTI applications to strictly adhere to the Draft NSR Manual, it does review each application to determine whether it contains sufficient information for the Agency to perform an independent and comprehensive top-down BACT analysis. Applications are not returned to the applicant merely because they fail, in form, to conform to the Draft NSR Manual, but they are returned if the Agency requires additional information to complete its own top-down BACT analysis. (Testimony of M. Hopkins.)

34. The five steps to perform a BACT determination enumerated in the Draft NSR Manual are:

1) identify all control technologies;

2) eliminate technically infeasible or nonapplicable control technologies;

3) rank remaining technologies by emission control effectiveness;

4) evaluate most effective controls and document results;

5) select BACT. (Testimony of M. Hopkins; Draft NSR Manual, Appellant Ex. A, p. B.6 and B.7.)

35. Testifying on behalf of the Director, Mike Hopkins, Assistant Chief of Permitting, OEPA Division of Air Pollution Control ("DAPC"), indicated he has supervised the issuance of PTIs for new and modified air contaminant sources since 1993. Mr. Hopkins testified that, in the course of his employment, he has become quite familiar with PSD analyses. He also noted that Ohio has only one regulation providing guidance on performing a BACT determination, OAC Section 3745-31-01(M). Specifically OAC 3745-31-01(M) provides a definition of BACT that is to be applied on a "case-by-case basis," considering several factors including "energy, environmental and economic impacts." Mr. Hopkins testified that the regulation's broadly-worded definition of BACT allows his Agency considerable latitude when reviewing individual applications. (Testimony of M. Hopkins.)

36. Permits undergoing PSD review are subject to a BACT analysis for pollutants emitted in significant amounts. Emission amounts are deemed significant when they exceed the PSD significant emissions rate for a regulated pollutant. The University's proposed emissions for NOx, CO, VOC, and PM_{10} all exceeded their respective PSD significant emissions rate threshold of 40, 100, 40, and 15 tons per year, respectively. Relative to the BACT analysis for NOx at issue in the instant matter, the University proposed that the CUP expansion project would emit NOx at a rate of 225 tons per year. (Testimony of M. Hopkins.)

37. To reach their independent BACT determination in accordance with OAC 3745-31-01(M), OEPA personnel indicated that they consulted and relied upon the following sources of information:

(a) 1990 Draft NSR Manual providing general framework for BACT;

(b) Ohio's Engineering Guide 46 pertaining to cost-effectiveness;

(c) Technical discussions with USEPA, including, but not limited to, weekly/monthly

discussions between Alan Lloyd and Region V personnel regarding pollution controls for turbines and current BACT for turbines;

(d) Technical papers, journals and publications, such as Air Pollution Engineering Manuals 40 and 42, and the Combined Turbine Work Group Paper (State Ex. 1 and 5; Appellant Ex. I);

(e) Office of Air Quality Planning and Standards Control Cost Manual ("OAQPS") and other similar sources pertaining to cost-effectiveness;

(f) Local, state, and national permit databases comparing similar projects or information, including, but not limited to, the RACT-BACT-LAER Clearinghouse[12] ("RBLC") database; USEPA Region IV spreadsheet; Ohio permitting information; other state permitting information; supplemental data provided by applicant or other sources; and the professional judgment and/or experience of the OEPA staff and the staff of the local air agency;

(g) Site-specific information provided by the applicant; and

(h) Any other information obtained or known by OEPA or supplied to OEPA which in the Agency's judgment is credible to support or reject issuance of a permit. (Testimony of M. Hopkins, B. Miller, A. Lloyd.)

BACT Analysis: Step 1 - Identify all control technologies

38. Step 1 of a top-down BACT analysis requires the identification of all available control technologies with practical potential for application to the specific emissions unit and the pollutant under evaluation. In Part 5 of its initial application,[13] UC listed the following NOx control

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[12] The Internet access point to USEPA's RBLC web site states, "[T]he RBLC database contains information distilled from early notification submittals and air permits received from State and local air pollution control programs in the United States. The RBLC Web site also contains summary information on air pollution emission standards. The data assists State/local agency personnel and private companies in determining what types of controls and pollution prevention measures have been applied to and/or are required for various sources and the effectiveness of these technologies." (http://cfpub.epa.gov./rblc/htm/bl02/cfm.)

[13] The initial application contained individual BACT analyses for NOx, CO and VOC. Amended applications altered the BACT determinations for CO and VOC and included a BACT determination for PM_{10}. The original BACT determination for NOx remained unchanged

technologies as potentially applicable to the UC project: selective noncatalyst reduction ("SNCR"); water/steam injection; XONON™; SCONOx™; selective catalytic reduction ("SCR"); and DLN. (UC Ex. 12.)

39. To generate the list of control technologies, EQM, UC's environmental consultants, relied on their own experience as to available control technologies and reviewed USEPA's RBLC database. (Testimony of D. Miller.)

40. Appellant Arnett, through her expert's testimony, argued that the controls listed by the University in Step 1 are insufficient for two reasons. First, Mr. Koucky submitted that the application should have included a different model of turbine, the Siemens Cyclone. He testified that the Siemens Cyclone would emit 10ppm of NOx compared to the Titan 130 model chosen by UC, which would emit 25 ppm. Additionally, he submitted that two clean liquid fuel types were improperly omitted from UC's application. Specifically, Mr. Koucky suggested that ultra-clean diesel fuel and soy-based biodiesel fuel should have been listed as alternatives to the transportation grade, low sulfur fuel oil proposed as the back-up fuel for the turbines. (Testimony of W. Koucky; Appellant Ex. Q.)

41. As to whether the Siemens Cyclone or Titan 130 should have been the turbine selected for this particular project, testimony established that OEPA does not require an applicant to include alternative makes and models of turbines. Ohio EPA typically reviews PTI applications as submitted and believes that the applicant is, generally, in the best position to determine which make or model comports with the particular demands of a project. (Testimony of M. Hopkins and B. Miller.)

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throughout the amendment process.

42. Further, testimony revealed that UC did, in fact, consider the Siemens Cyclone during the planning stages. The University subsequently dismissed it, and others, because no turbine manufacturer responding to the University's request for proposal[14] guaranteed a NOx emissions rate lower than the 25 ppm emissions rate guaranteed by Solar Turbines, Inc., the manufacturer of the selected Titan 130. (Testimony S. Leesman.)

43. Regarding the two fuels proposed by Mr. Koucky, testimony indicated that neither the ultra-clean diesel fuel nor the biodiesel fuel was generally available in the Cincinnati area at the time UC submitted the permit application to OEPA. Moreover, biodiesel fuel is not suitable for use with the Titan 130 turbine, in that it is incompatible with combustion technology. (Testimony of D. Miller and Testimony of L. Witherspoon.)

44. Relying on a RBLC spreadsheet posted on the Internet by USEPA Region IV and its own extensive experience with numerous PTI applications for turbine projects, OEPA concluded that the University had properly identified all available control technologies with practical potential for application to the specific emissions unit and the pollutant under evaluation. (Testimony A. Lloyd.)

BACT Analysis: Step 2 - Eliminate technically infeasible options

45. Step 2 of the analysis requires the elimination of technically infeasible options. The University rejected three potential NOx control technologies due to their technical incompatibility with the Titan 130 turbine: SNCR; water/steam injection; and XONON™. (UC Ex. 12.)

46. Ohio EPA concurred with, and Appellant does not dispute, the rejection of these

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[14] When responding to the University's request for proposal, Alstom, now Siemens, expressly crossed out the word "guarantee" in its proposal and wrote that it "expected" NOx emission of 10ppm, but only at 100% load and within a limited temperature range. At all other loads, Alstom "expected" NOx emissions of 25 ppm. (Testimony S. Leesman.)

technologies. (Testimony of W. Koucky and M. Hopkins.)

BACT Analysis: Step 3 - Rank remaining control technologies

47. Step 3 requires that the remaining technologies be ranked according to control effectiveness. The University's application ranked the remaining control technologies in descending control effectiveness as follows: SCONOx™, SCR, and DLN burners. Mr. Koucky does not dispute the ranking order, but argues that UC should have formatted the data in accordance with the hierarchical table recommended in the Draft NSR Manual. He believes that the format contained in the Draft NSR Manual provides a more thorough review of the technologies and is easier for the general public to understand. (Testimony of W. Koucky; Appellant's Ex. Q.)

48. The Agency did not object to the University's particular format of the data contained in Step 3. As explained by Mr. Hopkins, OEPA does not reject analysis that might differ, in form, from that recommended in the Draft NSR Manual, so long as the substance of the analysis provides sufficient information to confirm a BACT determination. (Testimony M. Hopkins.)

BACT Analysis: Step 4 - Evaluation of effective controls

49. Step 4 of a BACT analysis evaluates and documents the most effective control technology, considering both the beneficial and adverse energy, environmental, and economic impacts. If, for some reason, the most effective control option is rejected as BACT, then the analysis advances to evaluate the next most effective control. This procedure is repeated until a control technology is accepted as BACT. (Appellant Ex. A.)

50. In the instant appeal, Step 4 is the most controversial. The Draft NSR Manual, while not dispositive, provides a comprehensive overview of this step. Relative to this step, the manual, in

pertinent part, states:

> After the identification of available and technically feasible control technology options, the energy, environmental, and economic impacts are considered to arrive at the final level of control. For each option the applicant is responsible for presenting an objective evaluation of each impact. At this point the analysis presents the associated impacts of the control option in the listing. Both beneficial and adverse impacts should be discussed and, where possible, quantified. In general the BACT analysis should focus on the direct impact of the control alternative.
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> If the applicant accepts the top alternative in the listing as BACT, the applicant proceeds to consider whether impacts of unregulated air pollutants or impacts in other media would justify selection of an alternative control option. If there are no outstanding issues regarding collateral environmental impacts, the analysis is ended and the results proposed as BACT. In the event that the top candidate is shown to be inappropriate, due to energy, environmental, or economic impacts, the rationale for this finding should be documented for the pubic record. Then the next most stringent alternative in the listing becomes the new control candidate and is similarly evaluated. This process continues until the technology under consideration cannot be eliminated by any source-specific environmental, energy, or economic impacts which demonstrate the alternative to be inappropriate as BACT. [Draft New Source Review Manual (October 1990), p. B.8 - B.9.]

51. As will be discussed in detail below, OEPA and UC independently conducted lengthy reviews of SCONOx™ and SCR before rejecting them as not cost effective. Ultimately, the UC proposed DLN burners with NOx emission of 25 ppm as BACT. (UC Ex. 12.) The Agency agreed with the University's conclusion. (State Ex. 21.)

52. Appellant's expert, Mr. Koucky, asserts that the University's BACT determination is flawed. Though he did not conduct his own full BACT analysis, Mr. Koucky specifically finds fault with the application's rejection of SCONOx™ and SCR. (Appellant's Ex. 12; testimony of W. Koucky.)

Review of SCONOx™

53. SCONOx™, available since the late 1990s, controls NOx, CO and VOC by passing the flue gas from the turbines over catalytic reactor-absorbers arranged in alternating chambers. The flue-gas compounds are oxidized and then absorbed onto the catalyst surface. As the catalyst reaches saturation, the gas flow into the chambers is switched and the flue gas is redirected into a second set of chambers while a regenerating gas is passed over the first set of chambers, allowing the catalyst in the first set of chambers to regenerate. The regeneration process also reduces the absorbed nitrogen dioxide compounds to nitrogen and water before they are released into the atmosphere. The chambers alternate between absorption and regeneration cycles. The switching of cycles, and thus the switching of flue gas between the chambers, occurs frequently, perhaps as often as every fifteen minutes and involves many moving parts that require active maintenance. (UC Ex. 12; testimony of T. Keener.)

54. Tables D-1 and D-2 located in Appendix D of the University's PTI application, illustrate UC's calculations of the cost-effectiveness of SCONOx™. Table D-1 demonstrates the direct and indirect capital expenditure (the cost of purchasing and installing the control system) reflecting that the total capital expenditure for two SCONOx™ systems (one for each turbine/HRSG) would be $7,876,528. Table D-2 demonstrates the annualized cost-per-ton to remove NOx, taking into account the operational and maintenance costs and the capital recovery cost over the life of the system. This table reflects that the annualized cost for removing NOx using the SCONOx™ system would be $12,686 per ton. The University rejected SCONOx™ as BACT, concluding that $12,686 per ton of NOx removed is too high to be cost-effective. (UC Ex. 13.)

55. In making its cost-effectiveness calculations, the University relied upon Ohio EPA's

Engineering Guide 46[15], a document used by the Agency to "promote statewide uniformity and consistency" in estimating the costs of air pollution controls. (UC Ex. G; Testimony of A. Lloyd.) The University reviewed this document and then adjusted certain cost factors to compensate for the site-specific requirements of installing SCONOx™ at the University's already existing plant. Specifically, the University contended that the installation of SCONOx™ would necessitate increasing estimated costs of installing foundations and supports from 8% to 12% and increasing the handling and erection factor from 14% to 20%. Foundations and supports cost factors quantify the additional costs necessary to fortify UC's structure so that it can adequately support and house SCONOx™ systems. The handling and erection factor describes the increase costs dedicated to bringing in and constructing the SCONOx™ technology at the UC site. (Testimony of D. Miller.)

56. Additionally, the University applied a contingency rate of 20% to cover installation costs. The contingency rate is used to compensate for cost overruns of a project and unanticipated problems encountered during installation. A document published in 1998 by USEPA, the Combustion Turbine Working Group's "Cost-Effectiveness of Oxidation Catalyst Control of Hazardous Air Pollutant Emissions from Stationary Combustion Turbines" stated that, in instances such as presented herein, a contingency rate of up to 25% would be appropriate. Ms. Miller, of EQM, testified that the contingency rate of 20% was selected to accommodate the uncertainties of installing the two SCONOx™ systems in the existing plant. (Testimony of D. Miller.)

57. The cost projections submitted by the University were higher than what OEPA expected. Consequently, OEPA requested additional information to support the deviation from factors stated

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[15] Ohio EPA Engineering Guide 46 provides guidance on estimating costs and factors relating to, *inter alia,* capital recovery costs, annualized costs and cost-effectiveness data.

in Ohio EPA Engineering Guide 46. (Testimony of M. Hopkins, B. Miller.) Specifically, OEPA employees questioned the contingency factor and the capital recovery costs cited by UC. To further analyze the University's figures, OEPA reviewed an analogous cogeneration project executed by the University of Missouri involving two turbines, similar to the ones proposed by UC. In that project, both SCONOx™ and SCR were rejected as not being cost-effective. In the Missouri project, the cost for removing NOx with SCONOx™ technologies, was calculated to be $7,000 to $15,000 per ton, while the cost for removing NOx using SCR controls was $6611 per ton. Ohio EPA noted that a comparison of the two projects revealed that the cost-per-ton to remove NOx via SCONOx™ technologies in the UC project was within the range of the Missouri project, where SCONOx™ technologies were considered to be too expensive and, therefore, rejected as not cost-effective. (Testimony of A. Lloyd; UC Ex. 15.)

58. In reaching its ultimate conclusion that UC had adequately substantiated its cost-effectiveness figures relating to SCONOx™, the Agency relied on the expertise of its staff, its assessment of similar projects which had undergone review by other permitting authorities, supplemental information offered by the University and other information acquired by the Agency. (Testimony of B. Miller; State Ex. 11; Appellant Ex. G and I.)

59. Though the University based its rejection of SCONOx™ technologies solely on economic grounds, the application and testimony revealed other relevant concerns regarding this control. For example: (1) SCONOx™ is an emerging technology with few actual installations to analyze; (2) the frequent switching of flue gas flow across the catalysts chambers during absorption and regeneration cycles, with all of the associated mechanical linkages and dampers operating, presents concerns for proper maintenance, repair and outages; and (3) the catalysts must be washed, which

creates a wastewater stream that may be considered a hazardous waste. (Testimony of T. Keener; UC Ex. 13.)

60. Mr. Koucky, Appellant's expert, performed a cost-effectiveness analysis for the removal of NOx utilizing SCONOx™ systems and returned a significantly lower result. His calculations reflected that the cost per ton of NOx removed would be $4,072, nearly half of the cost predicted by the University. (Appellant Ex. CC.) A portion of the different result can be attributed to the fact that, rather than adjusting calculation assumptions to reflect site-specific direct and indirect capital costs and contingency factors, Mr. Koucky utilized the default values contained in Ohio EPA Engineering Guide 46 and OAQPS Cost Control Manual.[16] Mr. Koucky believes that UC's factors were inflated and argues that their project did not warrant the upward adjustment of cost factors employed by the University to calculate their cost-per-ton result. For example, Mr. Koucky asserts that the contingency rate of 20% selected by the University is too high and, instead, employed the 3% default rate cited in the OAQPS guide. Mr. Koucky notes that a 20% contingency rate may be appropriate if the CUP expansion project required extensive remodeling to incorporate the technology, or was a retrofit-type project. Mr. Koucky asserts that because the equipment is new and will be housed in a newly-constructed portion of the building, the project should not be considered a retrofit project. Conversely, the University agues, that although portions of the building will be new, considerable modifications to the existing structure must be made in order to prepare it to house the turbines and selected control technology. Additionally, Mr. Koucky selected a lower interest rate for borrowing money than UC's 10% money factor.

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[16] Reviewing authorities, such as OEPA, frequently use the OAQPS Guide to verify analyses submitted by permitees and to determine whether the permittee's analysis is performed in a reliable and consistent manner.

(Testimony of W. Koucky.)

61. The most significant divergence in cost-effectiveness computations, however, lies in Mr. Koucky's decision to aggregate pollutants to calculate the cost-per-ton of pollutant removed. Rather than aggregating NOx, CO and VOC, the University produced an annualized cost-per-ton number for each pollutant. Comparatively, in an alternate computation, segregation of the pollutants increased Mr. Koucky's cost-per-pollutant controlled from $4072 (cost when pollutants are aggregated) to $9694 (cost when pollutants are segregated) per ton of pollutant removed. (Testimony of W. Koucky, M. Hopkins, A. Lloyd, D. Miler.)

62. The Agency concurred with the University's method of calculating annualized cost for each individual pollutant. When determining cost-effectiveness, OEPA does not aggregate pollutants and is unaware of any state which does. Mr. Hopkins testified that during his 23-year tenure, he is unaware of any applicant suggesting that aggregation of pollutants is the correct way to calculate cost-effectiveness. Additionally, Ms. Miller, whose employer has prepared BACT analyses for clients in several states, testified that she is unaware of any cost-effectiveness calculations utilizing the aggregation method suggested by Appellant. (Testimony of M. Hopkins, A. Lloyd, D. Miler; State Ex. 25.)

Review of SCR

63. The selective catalytic reduction control process removes NOx from flue gas by injecting ammonia into the gas stream as the gas passes through a catalyst bed. The ammonia and NOx then react on the surface of a catalyst forming nitrogen and water. The catalyst is subject to physical deterioration over time, as well as chemical deactivation. Periodically, it must be washed and eventually replaced. (UC Ex. 12; testimony of D. Miller, T. Keener.)

64. The tables demonstrating SCR cost-effectiveness are located in Tables D-3 and D-4 of Appendix D of the PTI application. Table D-3 illustrates projections of direct and indirect capital costs. Noting that each of the two turbine/HRSGs would require one SCR system, the University calculated the total capital expenditure for both systems to be $5,260,092. Table D-4 reviews the annualized cost-per-ton to remove NOx through the use of SCR technologies, including operational and maintenance costs, as well as capital recovery costs over the life of the SCR system. The University's application demonstrated that the annualized cost for NOx removal using SCR technologies would be $11,834 per ton. Based upon these calculations and a review of similar projects, the University submitted that the annualized cost was too high to be cost effective and, accordingly, SCR should be rejected as BACT for the University's project. (UC Ex. 12; UC Ex. 13; testimony of D. Miller, T. Keener).

65. A pivotal assumption in assessing cost-effectiveness for SCR is determining a control efficiency rating. In selecting a control efficiency of 70%, the University relied on a wide range of sources. One, the "Alternative Control Techniques Document - NOx Emissions from Industrial/Commercial/Institutional Boilers" (1994), authored by USEPA, cites an efficiency rating range of 53% - 80% for SCR. Another document, Air Pollution Engineering Manual for Combustion Sources ("AP 40"), cites an effectiveness range of 60% - 90% for both "full scale and "pilot scales" systems. (Testimony of D. Miller, T. Keener; State Ex. 1 page 244.) Several other sources support UC's selection of a 70% control efficiency factor. Dr. Keener, testifying on behalf of the University, and Mr. Miller, of HCDES, both agreed that a 70% control efficiency is appropriate. Moreover, in 1994, the BMW Manufacturing Company, in South Carolina, assumed a SCR control efficiency of 70% in a project similar to the University's CUP expansion project. In

the BMW Manufacturing project, unlike UC's project, calculations projecting SCR operation at 70% efficiency did, indeed, produce cost-effectiveness results low enough to require SCR as BACT to control NOx emissions. (Testimony of T. Keener, B. Miller and A. Lloyd; UC Ex. 18.)

66. Another divergence between the parties' results lies in their calculations of capital recovery costs for the SCR systems. Ohio EPA Engineering Guide 46 defines "capital recovery costs" as "the annualized capital charges associated with capital recovery over the depreciable life of the system." (Appellant's Ex. G, at 5-17.) Capital recovery costs are a combination of depreciation, or life expectancy of the equipment, and the cost of borrowing money to purchase the control system. *Id.* These cost factors vary based upon the type of emissions unit on which the control is used, the intended use of the controls, the frequency of replacing parts and the rate at which the system deteriorates. (Testimony D. Miller.)

67. To calculate the capital recovery costs for the SCR systems, the University assumed a 10% interest borrowing rate and a 10-year life expectancy period, as cited in Ohio EPA Engineering Guide 46, which yielded a 16% capital recovery rate. (Appellee Ex. 13 CR Item 2, p. 92.)

68. Ohio EPA employees took several steps to verify the University's cost-effectiveness calculations and capital recovery costs for SCR. First, Alan Lloyd, calculated the SCR's cost-effectiveness using conservative, but, in his opinion, reasonable factor assumptions. Mr. Lloyd assumed an interest rate of 7.3% and a life expectancy period of 15 years, which yielded an 11% cost recovery factor. (State Ex. 24; Appellant Ex. I at p. 12-13.) Mr. Lloyd also increased the efficiency rating from 70%, as selected by the University, to 90%. Under these more stringent conditions, Mr. Lloyd's calculations produced a predictably lower cost-effectiveness outcome of

$7,498 per ton of NOx removed. Mr. Lloyd concluded that even this result was too high to be cost-effective for the University's project. To obtain further verification of the appropriateness of the calculations, OEPA forwarded the University's cost-effectiveness calculations for SCR control systems to USEPA Region V. On July 12, 2002, Mr. Lloyd noted that USEPA had no objections to the University's SCR cost-effectiveness calculations. (Testimony A. Lloyd; State Ex. 14.) Further, OEPA was unable to identify any permits in its own database where SCR was cost effective using a BACT analysis for comparable combined cycle combustion turbines. Ohio EPA did, however, identify a number of instances where SCR was rejected to control NOx in projects where cost calculations were similar to UC's. (State Ex. 24; testimony of A. Lloyd.)

69. In preparation for hearing, Appellant's expert performed a cost-effectiveness analysis for NOx removal using SCR. Mr. Koucky's result, $4,090 per ton removed, was significantly lower than either the University's or OEPA's. To reach his determination, Mr. Koucky selected a 90% efficiency rating and assumed that the SCR system would operate continually at this level throughout the life of the SCR control technology. Ninety percent efficiency is the highest percentage attributable to SCR efficiency in any of the source documents relied upon by the parties. Testimony supports that some SCR systems operate at 90% for a period of time. Over time, however, the effectiveness of catalytic systems, like SCR, decline as the catalyst becomes dirty and absorbs the reacted compounds. Use of fuel oil as a back-up source further reduces efficiency. (Testimony of D. Miller, T. Keener, W. Koucky.)

70. Mr. Koucky's analysis of SCR differed in several other respects. Mr. Koucky objected to the University's assumption of a 10-year life expectancy and, instead, employed a 15-year life expectancy for the SCR system, citing to Alternative Control Techniques Document, Table 6-8.

(Appellant's Ex. M.) And, as in his review of SCONOx™, he again urged that a 3% contingency factor was more appropriate for the requirements of this particular project, rather than the 20% contingency factor utilized by the University. (Testimony of W. Koucky.)

71. Reasons other than economic were offered to support the University's rejection of SCR to control NOx. Selective catalytic reduction utilizes ammonia as a reactant. Ammonia is considered to be a hazardous substance and the transportation, storage, and usage of ammonia in an urban campus setting is of concern to the University. (State Ex. 21; UC Ex. 19; testimony of T. Keener.) To counter this concern, Appellant argued that SCR control technologies could be operated with urea, rather than ammonia. Explaining that urea is chemically similar to ammonia, Mr. Koucky advised that it is less dangerous to store and transport. Mr. Koucky was unable to identify any documented commercial applications of SCR technologies injecting urea, rather than ammonia, as the reactant. Testimony also revealed that, notwithstanding urea's beneficial safety properties, thermal decomposition of urea can occur in the SCR process. It has been shown to generate isocyanic acid, cyanuric acid and other dangerous compounds. Further, because urea is converted to ammonia during the catalytic reaction, ammonia slip remains a concern. Ammonia slip occurs when unreacted ammonia passes through the SCR system and is released into the environment. Ammonia is also linked with the generation of fine particulate matter in the atmosphere and acid deposition[17]. (Testimony of W. Koucky, T. Keener; UC. Ex. 19.)

72. Additionally, SCR systems require recurrent replacement of spent catalysts, which must be

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[17] The CAA recognizes that acid deposition, commonly referred to as acid rain, "represents a threat to natural resources, ecosystems, materials, visibility, and public health; . . . ." As such, the federal government has developed a regulatory scheme to address its impact. (See generally CAA Sections 402 through Sections 416.)

handled and disposed of as hazardous wastes. As noted previously, use of sulfur fuel poisons the SCR catalysts and consequently, necessitates down-time and washing of the catalyst. The cleansing process creates an additional waste stream which must be managed. (UC Ex. 19.)

STEP 5: Selection of BACT

73. In the final step, Step 5, the most effective control option not eliminated in step 4 is proposed as BACT for the regulated pollutant under review. After rejecting SCONOx™ and SCR as BACT, the University selected DLN burners, emitting NOx at a rate of 25ppm. The Director concurred with this selection. (Testimony of M. Hopkins and A. Lloyd.)

74. In addition to the steps detailed above, University and OEPA employees compared UC's project to other similar projects throughout the country to confirm that the BACT determination was consistent. (UC Ex. 12; testimony of D. Miller, M. Hopkins, A. Lloyd.) When conducting its comparison, UC defined similar projects to include projects which are combined cycle or cogeneration turbine projects installed after 1995, where the turbines are 25 MWs or less. (U.C. Ex. 12; testimony of D. Miller, M. Hopkins.) The University asserts that the size of the turbine is a critical factor, as it determines the volume of air flow, which then dictates the size and cost of the control device. The University submits that economies of scale should be applied when comparing turbine projects; larger turbines can control a greater amount of pollutants at a lesser cost. Moreover, combustion technology differs between large and small turbines, which influences the pollutant loading to the control device. (Testimony of L. Witherspoon.)

75. Appendix C of the University's application enumerates the similar projects gleaned from the RBLC database. (UC Ex. 14). Ten of the twelve projects listed did not select SCONOx™ or SCR as BACT. Since the time of the application, six additional similar projects have been added,

including UC's project. None selected SCR or SCONOx™ as BACT. All chose DLN burners emitting 25ppm as BACT for controlling NOx. (Testimony of D. Miller; UC Ex. 15.)

76. Moreover, Leslie Witherspoon, Environmental Programs Manager for Solar Turbines, Inc., whose company has provided permitting and data support for approximately 11,000 turbine projects in over 90 countries, testified that Solar Turbines, Inc. has sold over 100 turbines sized less than 25 MW in the past few years. She also testified that, in areas designated "in attainment" as in the instant matter, DLN was determined to be BACT for all turbines installed by Solar Turbines, Inc.. Interestingly, even for turbines installed in nonattainment areas (areas subject to more stringent pollution control) only one quarter of the projects selected SCONOx™ or SCR to control NOx. (Testimony of L. Witherspoon; UC Ex. 17.)

77. Appellant's collection of allegedly similar projects included different projects than the University's data set. Mr. Koucky's comparative data set included larger turbine projects, projects that were dissimilar in operation, and some that were located in areas of the country subject to stricter pollution control standards. Specifically, the turbines in Mr. Koucky's data set selecting SCR as BACT ranged in size up to 170MW for projects in Georgia and Florida; failed to indicate whether the projects could use fuel oil as a back-up; and included some projects which were not subject to BACT, but to LAER, a stricter pollution standard required in nonattainment areas. (Appellant Ex. U and V, UC 18; testimony of D. Miller.)

78. Appellee University of Cincinnati presented the expert testimony of Timothy Keener, Ph.D., PE, QEP. Dr. Keener, a professor of Civil and Environmental Engineering in the Air Pollution Program at the University of Cincinnati, has been involved in air pollution control study, research, analysis, and writing since 1974. In preparation for hearing, Dr. Keener reviewed the

application and concluded that the University had selected the proper control technology. Further, he testified that stricter control of NOx (greater than 25 ppm) is not necessary to protect public health in the Cincinnati area, since the area is already in attainment and the University's NOx emission would constitute a small percentage of the area's total NOx emission limit. Dr. Keener testified that he reviewed sources in Hamilton County which emit NOx and concluded that approximately 460 tons of NOx are emitted per day. The University's project, implementing DLN control technology, will emit approximately 0.1% of the total amount emitted per day. Further, he agreed with the University's conclusion that SCR and SCONOx™ possess negative attributes that prevent them from being preferable to DLN as a NOx control technology in this particular project. (Testimony of T. Keener.)

CONCLUSIONS OF LAW

1. Ohio Revised Code ("RC") Section 3745.05 authorizes the Commission to conduct *de novo* hearings on final actions of the Director. Specifically, RC Section 3745.05 states, in pertinent part, as follows:

> If upon completion of the hearing, the commission finds that the action appealed from was lawful and reasonable, it shall make a written order affirming the action, if the commission finds that the action was unreasonable or unlawful, it shall make a written order vacating or modifying the action appealed from. (R.C. 3745.05)

2. Thus, the statutory duty of review imposed upon the Commission is a determination of whether the Director's issuance of the PTI on August 15, 2003 to the University of Cincinnati was unlawful or unreasonable. "Unlawful" means that the action taken by the Director was not in accordance with the relevant, applicable law. "Unreasonable" means that the action does not comport with reason or that it has no valid factual foundation. (*Citizens Committee to Preserve*

Lake Logan v. Williams (1977) 56 Ohio App. 2d 61, 70.)

3. The Commission may not substitute its judgment for that of the Director and where the Director is charged with the implementation of statutes and regulations, the Commission must show deference to his interpretation and application of these statutes and rules. (*State, ex. rel. Celebrezze v. National Lime and Stone Co.*, 68 Ohio St. 3d. 377 (1994).) Further, when determining whether the decision under appeal rests upon a valid factual foundation, if the record before the Commission demonstrates that two otherwise qualified expert witnesses disagree on a matter within their expertise, the Commission will generally defer to the opinion supporting the action of the Director. (See. e.g., *CF/Water v. Schregardus* (Oct. 27, 1994), Case No. EBR 112570, 1994 Ohio ENV LEXIS 15 *18; *CECOS Intl., Inc. v. Shank* (April 24, 1991), Case Nos. EBR 132196, 132198, 1991 Ohio ENV LEXIS 4, *26-38; *American Legion Post 526 v. Ioannides* (Dec. 31, 1991), Case No. 292410, 1991 Ohio ENV LEXIS 8, *8.)

4. Ohio's PSD program, like those of other states, is constructed to implement the goals of the CAA through issuance and enforcement of PSD permits within its jurisdiction. (See Section 110 of the CAA.) Having been granted the primary authority to implement a "state implementation plan" designed to maintain and enforce the NAAQS established pursuant to the CAA, Ohio promulgated OAC Chapter 3745-31, which empowers Ohio to implement and enforce its federally-approved PSD program. (See Section 110 of CAA; OAC Chapter 3745-31.)

5. If a project is subject to PSD review, then a BACT determination must be performed for each regulated pollutant satisfying the following criteria: (1) the pollutant must be emitted from a major source or major modification exceeding the tons per year emissions level established in the PSD rules; (2) the pollutant being emitted from the new major source or modification is located in

a PSD attainment area for all criteria pollutants; and (3) the proposed pollutant emission or emissions increase is considered significant under PSD rules. (OAC 3745-31-15.)

6. Having discussed PSD requirements in the Findings of Fact, the Commission observes that it is uncontroverted that the University's project satisfies all three criteria used to determine whether a project is subject to the PSD program and, therefore, is required to perform a BACT analysis for specific regulated pollutants. (See Findings of Fact 1 through 5.)

7. The regulation providing guidance to determine BACT, found in OAC 3745-31-01(M), states:

> 'Best available control technology' means an emissions limitation (including a visible emissions standard) based upon the maximum degree of reduction for each air pollutant subject to the regulation under the Clean Air Act that would be emitted from any proposed major stationary source or major modification that the director, on a case-by-case basis taking into account energy, environmental and economic impacts and other costs, determines is achievable for such major stationary source or major modification through application of production processes or available methods, systems and techniques, including fuel combustion techniques for control of such air pollutant. (OAC 3745-31-01(M).)

8. Neither the Ohio Revised Code nor the Ohio Administrative Code prescribes a procedure for determining BACT. The most common procedure, a top-down BACT analysis, is detailed in USEPA's Draft NSR Manual. Released in 1990, the widely-accepted Draft NSR Manual was never issued as an enforceable document. Accordingly, a top-down styled BACT determination is not a legal requirement. (*See In re: Steel Dynamics, Inc.*, 2000 EPA App. LEXIS 18, 44 (EAB 2000); *In re: Hillman Power Company, LLC*, 2002 EPA App. LEXIS 15 (EAB 2002); *In re: General Motor, Inc.*, 2002 EPA App. LEXIS 2 (EAB 2002); *In re: Knauf Fiber Glass, GmbH*, 1999 EPA App. LEXIS 2, 33 n. 25 (EAB 1999).) Therefore, the Director is entitled to discretion

when making a BACT determination. A BACT determination would not be found to be unreasonable or unlawful simply because the Director deviated from a top-down styled analysis, provided that all regulatory criteria were considered and applied appropriately. (*In re: Steel Dynamics, Inc.*, 2000 EPA App. LEXIS 18, 44 (EAB 2000); *In re: General Motor, Inc.*, 2002 EPA App. LEXIS 2 (EAB 2002); *In re: Hillman Power Company, LLC*, 2002 EPA App. LEXIS 15 (EAB 2002); *In re: Knauf Fiber Glass, GmbH*, 1999 EPA App. LEXIS 2, 33 n. 25 (EAB 1999); *American Paper Inst. v. Reilly*, Nos. 89-1428 and 90-1364 (DC Cir.), and *American Paper Inst. v. Reilly*, No. 89-2030 (D.C.C), Settlement Agreement; 56 Fed. Reg 34202 (July 26, 1991).)

9. In the instant appeal, however, the University and the Director did employ a BACT analysis designed to comport with the Draft NSR Manual and OAC 3745-31-01(M). In reviewing and issuing this permit, the Director consulted numerous state and federal technical documents and project comparisons, and relied upon the extensive professional judgment and expertise of his staff.

10. Relative to Step 1 [Identify All Control Technologies], Appellant asserts that the Director's review was inadequate in that the Director failed to consider alternative technologies, but points to no rule or regulation requiring the Director to do so. Testimony by Mr. Lloyd, Mr. Hopkins, and Mr. Miller supports that OEPA employees reviewed the historical and contemporary data contained in the RBLC, and that they also employed their professional judgment in reviewing the entire application. Accordingly, the Commission finds that the Director properly and reasonably determined that the University's BACT analysis identified all available control technologies.

11. Appellant's objection to Step 2 [Eliminate Technically Infeasible or Nonapplicable Control Technologies] was limited to the thoroughness and nature of the discussions contained in the

University's application, not the actual outcome of the review. Appellant presented no evidence suggesting that an alternatively-styled analysis of Step 2 would have resulted in a different outcome for this step. Testimony supports a finding that the Director's review of Step 2 was sufficient, as additional information was unlikely to produce a different result. Accordingly, the Commission finds that the Director properly determined that the University had eliminated all technically infeasible control options. Therefore, the Commission finds that the Director's acceptance of the University's conclusion regarding Step 2 was reasonable.

12. The Commission finds that for the purposes of reviewing Step 3 [Rank Remaining Technologies By Emissions Control Effectiveness], the University's failure to present the data in a standardized hierarchical format did not negate the undisputed completeness or accuracy of the information provided. Accordingly, the Commission finds that the Director's review and acceptance of the University's data was reasonable.

13. Appellant's appeal of this matter rests heavily upon the Director's acceptance of the University's BACT determination relating to Step 4 [Evaluate the Most Effective Controls and Document], which led to the rejection of SCONOx™ and SCR as control technologies for NOx emissions in this project.

14. Relative to the rejection of SCONOx™ to control NOx emissions, the evidence reflects that segregating pollutants to calculate the cost of removing a pollutant is the appropriate and accepted method. Indeed, when Mr. Koucky recalculated the cost for SCONOX™ using the non-aggregation method and default cost factors, his cost results increased to $9694 as compared to the University's result of $12,686, when utilizing site-specific factors to calculate the cost per ton of NOx removed. Indeed, had Mr. Koucky employed site-specific factors, as the University did, his

cost per ton of NOx removed would have been even closer to the University's cost projections.

15. In light of the testimony, the Commission believes it to be a strained application of cost analyses to compare calculations derived from aggregating pollutants to calculations derived from examining each pollutant individually. Testimony established that the Agency does not aggregate pollutants when determining cost-effectiveness and is not aware of any state that does. Although aggregation of pollutants is not prohibited, no substantive data was advanced at hearing demonstrating its use as a standard, generally-accepted method for ascertaining cost-effectiveness for various control technologies.

16. Additionally, Appellant asserts that several of the underlying cost assumptions leading to the rejection of SCONOx™ were inflated: (1) the estimated cost factor for installing foundations and supports; (2) the handling and erection factors; and (3) the contingency rate. Accurately predicting construction costs is not an exact science. Through Ms. Miller, the University offered persuasive testimony to justify why the foundation and supports costs, the handling and erection costs, and the contingency costs would be higher in the University's project, than the default rates offered in various technical manuals and utilized by Appellant's expert. As such, the Commission finds a valid factual foundation exists for the Director's acceptance of the site-specific cost factors employed by the University.

17. Regarding SCR, Appellant's greatest divergence in cost computations occurred as a result of selecting a 90% efficiency rating for the life of the control technology. In selecting a lower 70% efficiency rating, the University allowed for operational factors, noting that while it was possible for SCR to operate at 90% efficiency, such a high level of efficiency could not be sustained over an extended period of time. Degradation of the control mechanics and environmental catalyst

reduction would inevitably reduce the efficiency rating over the life of the system.

18. The record does not support the acceptance of a 90% efficiency rating over the lifetime of the SCR system. Therefore, the Commission can not rely upon this portion of Mr. Koucky's calculations. Noting that a 90% efficiency outcome is unsustainable and that the Agency, in accepting a 70% efficiency factor, relied on several technical manuals and the professional judgment of its staff, the Commission finds valid factual grounds for OEPA's acceptance of the 70% control efficiency.

19. Appellant also objected to the life expectancy rate and the cost of borrowing money factor used by UC to calculate the capital recovery costs for the SCR systems. As with other portions of the University's application, the Agency recalculated UC's cost projections using more conservative numbers. Testimony from Mr. Lloyd indicates that, even when OEPA factored in a longer life expectancy and a lower interest rate, SCR technologies were not cost-effective in the instant matter. Accordingly, the Commission finds a valid factual foundation for the Director's conclusion that SCR was properly rejected as not cost-effective for controlling NOx in the University's project.

20. Moreover, the Commission finds that the testimony offered, describing the general negative environmental attributes of SCONOx™ and SCR, factually supports the rejection of both control technologies as best available control technology. Accordingly, the Commission finds that OEPA's acceptance of the University's rejection of SCONOx™ and SCR, as BACT for the CUP expansion project, was based upon a valid factual foundation and was reasonable.

21. In its review of Step 5 [Select BACT], OEPA considered the project in its entirety and compared it to similar projects throughout the nation to determine whether the selection of DLN

burners was appropriate. The Commission finds that UC's definition of a similar project and thus, its comparison data set, was more analogous to the University's actual project than Appellant's broader scope of data and projects. Correspondingly, the Commission finds Appellant's set of projects departed significantly from the University project and, therefore, is inapplicable to this particular matter. Accordingly, the Commission finds that OEPA's acceptance of DLN burners as BACT to control NOx was reasonable.

22. Appellant's expert, Mr. Koucky, testified in great detail and fully described his concerns about the University's and OEPA's methodology in determining BACT for this project. In opposition to Appellant's assertions, the University presented numerous witnesses who offered detailed testimony regarding the research conducted and data collected to complete the University's application. Similarly, the record contains considerable testimony and evidence relative to the independent, in-depth review of this application conducted at the Agency. The Commission finds the evidence and testimony of co-Appellees persuasive. Further, the Commission finds the Director's decision to issue the instant PTI well-supported by the credible and persuasive testimony provided by Dr. Keener, the University's expert, as well as by the other testimony offered on behalf of the Director and University.

23. Based on the foregoing, the Commission finds that the Director's issuance of the University's PTI was based on a valid factual foundation and was reasonable. Further, the Commission finds that his application of relevant laws and regulations, including the broadly-worded OAC 3745-31-01(M), to determine BACT for the instant project, was lawful.

FINAL ORDER

In light of the foregoing, the Commission hereby finds the Director's action herein to be both reasonable and lawful and rules to AFFIRM the Director's issuance of a Final Air PTI to Appellee University of Cincinnati.

The Commission, in accordance with Ohio Administrative Code Section 3746-13-01, informs the parties that:

> Any party adversely affected by an order of the commission may appeal to the court of appeals of Franklin County, or, if the appeal arises from an alleged violation of a law or regulation, to the court of appeals of the district in which the violation was alleged to have occurred. The party so appealing shall file with the commission a notice of appeal designating the order from which an appeal is being taken. A copy of such notice shall also be filed by the appellant with the court, and a copy shall be sent by certified mail to the director or other statutory agency. Such notices shall be filed and mailed within thirty days after the date upon which appellant received notice from the commission of the issuance of the order. No appeal bond shall be required to make an appeal effective.

THE ENVIRONMENTAL REVIEW APPEALS COMMISSION

Julianna F. Bull, Chair

Toni E. Mulrane, Vice-Chair

Melissa M. Shilling, Member

Entered in the Journal of the Commission this 5th day of August, 2004.

COPIES SENT TO:

KAREN ARNETT	[CERTIFIED MAIL]
CHRISTOPHER JONES, DIRECTOR	[CERTIFIED MAIL]
UNIVERSITY OF CINCINNATI	[CERTIFIED MAIL]
Richard C. Sahli, Esq.	
Brett A. Kravitz, Esq.	
Yanna Robson Higgins, Esq.	
David E. Northrop, Esq.	
Katerina M. Eftimoff, Esq.	

FINDINGS OF FACT,
CONCLUSIONS OF LAW
AND FINAL ORDER

Case No. ERAC 315205

CERTIFICATION

I hereby certify that the foregoing is a true and accurate copy of the FINDINGS OF FACT, CONCLUSIONS OF LAW AND FINAL ORDER in KAREN ARNETT, v. CHRISTOPHER JONES, DIRECTOR, ET AL., Case No. ERAC 315205 entered into the Journal of the Commission this 5th day of August, 2004.

Mary J. Oxley

Mary J. Oxley, Executive Secretary

Dated this 5th day of
August, 2004, at Columbus, Ohio.