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10/01/2012 03:31 PM

To: "midwestwindhcp@fws.gov" <midwestwindhcp@fws.gov>
cc: Jack Van Kley <jvankley@vankleywalker.com>
Subject: Comments regarding proposed Midwest Multi-Species
HCP/FWS-R3-ES-2012-N179

Dear Mr. Amidon,

Attached are Appendices 5-9 to the Comments of Union Neighbors United, Julie F. Johnson, and Robert and Diane McConnell provided in my earlier email.

Respectfully,

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Appx. 7, UNU Reply Brief.pdf



Appx. 8, McConnell Ltr. to Seymour.pdf



Appx. 9, Babcock Recommendations.pdf



Appx. 5, Lott Email.pdf



Appx. 6, UNU Opening Brief.pdf



Megan
Seymour/R3/FWS/DOI
07/15/2009 04:02 PM

To "Lott, Keith" <Keith.Lott@dnr.state.oh.us>
cc "Scott, Dave" <Dave.Scott@dnr.state.oh.us>, Jeff_Gosse@fws.gov, "Lott, Keith" <Keith.Lott@dnr.state.oh.us>
bcc

Subject Indiana bat conference call arrangements?—

Thursday 8:30 EST/7:30 CST
Call in number: 866-875-5373
Passcode: 6821001

"Lott, Keith" <Keith.Lott@dnr.state.oh.us>



"Lott, Keith"
<Keith.Lott@dnr.state.oh.us>
07/15/2009 03:57 PM

To <Jeff_Gosse@fws.gov>, "Lott, Keith" <Keith.Lott@dnr.state.oh.us>
cc "Scott, Dave" <Dave.Scott@dnr.state.oh.us>, <Megan_Seymour@fws.gov>
Subject RE: Indiana bat conference call arrangements?

How about 8:30 (eastern)? Megan can you arrange the call-in information?

-----Original Message-----

From: Jeff_Gosse@fws.gov <Jeff_Gosse@fws.gov>
Sent: Wednesday, July 15, 2009 3:14 PM
To: Lott, Keith <Keith.Lott@dnr.state.oh.us>
Cc: Scott, Dave <Dave.Scott@dnr.state.oh.us>; Megan_Seymour@fws.gov <Megan_Seymour@fws.gov>
Subject: RE: Indiana bat conference call arrangements?

Either way. I can talk with Megan and she can represent both of us or we can all/most try to talk early. I am typically in the office these days around 7 or 7:15 my time. If necessary, I could even try to talk on my Blackberry while commuting in, which means I could start as early as 6:30 my tiime.

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To

07/15/2009 02:02
PM

<Jeff_Gosse@fws.gov>

cc

"Scott, Dave"
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Subject
RE: Indiana bat conference call
arrangements?

I think the general idea was to discuss the plethora of Indiana bat captures we've had on proposed wind turbine facilities recently, and what our coordinated approach should be.

I have a meeting at 9:30 (eastern), but am free before then.

Keith

-----Original Message-----

From: Jeff_Gosse@fws.gov [mailto:Jeff_Gosse@fws.gov]

Sent: Wednesday, July 15, 2009 2:51 PM

To: Lott, Keith

Cc: Scott, Dave; Megan_Seymour@fws.gov

Subject: Re: Indiana bat conference call arrangements?

I am not sure what the original question was, but I am tied up all day tomorrow after 9:00 my time.

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Inactive hide details for " height="16">"Lott, Keith"
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To

07/15/2
009
01:12

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<Megan_Seymour@fws.gov>,
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PM

cc

Subject

Indiana bat conference call
arrangements?

Tomorrow at 11 works for Dave and I, how about you all?

Keith

Keith Lott, Wind Energy Wildlife Biologist

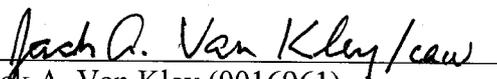
Old Woman Creek Nat'l Estuarine Research Reserve and State Nature
Preserve
Ohio Division of Wildlife
2514 Cleveland Road East
Huron, OH 44839
Office phone: 419-433-4601
Cell: 419-602-3141
Fax: 419-433-2851

**BEFORE
THE OHIO POWER SITING BOARD**

**In the Matter of the Application of)
Buckeye Wind LLC for a Certificate)
to Install Numerous Electricity)
Generating Wind Turbines in)
Champaign County to be Collected at)
an Electrical Substation in)
Union Township,)
Champaign County, Ohio)**

Case No. 08-666-EL-BGN

**OPENING POST-HEARING BRIEF OF INTERVENORS UNION NEIGHBORS
UNITED, INC., ROBERT AND DIANE MCCONNELL, AND JULIA F.
JOHNSON**


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TABLE OF CONTENTS

I. INTRODUCTION1

II. CHAMPAIGN COUNTY AND THE UNU INTERVENORS3

III. THE BUCKEYE WIND PROJECT, AS CURRENTLY PROPOSED, DOES NOT CONSTITUTE THE MINIMUM ENVIRONMENTAL IMPACT AND DOES NOT SERVE THE PUBLIC INTEREST, CONVENIENCE AND NECESSITY.8

 A. The Buckeye Wind Project As Proposed Will Have a Net Environmental Detriment8

 1. Buckeye Wind Has Failed To Present Credible, Admissible Evidence That Its Wind Power Production Will Improve Air Quality By Replacing Energy From Sources Of Higher Emissions Such As Coal-Fired Power Plants.....8

 2. The Buckeye Wind Project As Proposed Will Cause Serious Discomfort, Sleep Deprivation, And Health Issues13

 a) To Prevent Sleep Deprivation, Annoyance, And Health Problems From Inherently Intrusive Wind Turbine Noise, The Board Should Not Allow Buckeye Wind To Increase The Noise Levels Imposed On Nonparticipating Neighbors Of The Wind Project By More Than Five dBA Above The Background Sound Level.13

 b) To Determine The Intrusiveness Of Wind Turbine Noise, The Ambient Background Sound Level Must Be Measured Accurately To Determine Existing Noise Levels16

 c) To Accurately Evaluate Noise Impacts On The Community, The Predicted Noise Produced By The Wind Turbines Must Be Accurately Calculated.28

 d) No Nonparticipating Neighbor Should Be Exposed To More Than 35 dBA Of Noise At Any Time.....36

 e) The Wind Turbines Should Be Located At Least 1.25 Miles From Any Nonparticipating Neighbor46

 f) The Board Should Not Allow The Wind Project’s Low Frequency Noise To Exceed 60 dBC As An Absolute Limit Nor To Exceed 20 Decibels Above The LA90 Pre-Construction Background Sound Level Plus Five Decibels.....49

g) The Wind Project Must Comply With The Noise Standards At The Property Lines Of Nonparticipating Neighbors, Not Just At The Residences.....	54
h) Biased Observations About Turbine Noise By Wind Turbine Proponents Do Not Justify The Siting Of Wind Turbines Uncomfortably Close To Objecting Neighbors	55
i) Buckeye Wind’s Irresponsible Siting Of Numerous Wind Turbines Unacceptably Close To Nonparticipating Neighbors Does Not Justify The Issuance Of A Certificate That Fails To Protect The Neighbors’ Comfort, Property, And Health.	56
3. The Board Should Not Approve The Siting Of Wind Turbines That Will Cast Excessive Shadow Flicker On Neighboring Land And Residences	59
4. The Buckeye Wind Project As Proposed Will Unreasonably Damage Wildlife	61
a) The Board Should Implement Its Duty To Protect Ohio’s Wildlife By Including Reasonable Conditions In The Certificate To Prevent The Applicant From Killing Indiana Bats And Destroying Their Habitat.....	61
b) Buckeye Wind Should Not Be Allowed To Kill Or Destroy The Habitat Of Other Species Of Bats.....	67
c) Because Counting Birds At One Location In 84 Square Miles Cannot Adequately Assess The Wind Turbines’ Risk To The Birds, The Application Should Be Returned To Complete The Task	68
5. As The Wind Project Is Currently Configured, Its Environmental Damage Will Exceed Its Environmental Benefit	69
B. While Buckeye Wind Has Failed To Introduce Admissible Evidence Of Its Project’s Economic Benefit, The Buckeye Wind Project Will Impose Considerable Socioeconomic Damage On Its Neighbors And The Community	70
1. The Applicant Introduced No Admissible Evidence To Support Its Assertion That The Wind Project Offers Socioeconomic Benefits.....	70
2. The Wind Project Will Substantially Reduce The Value Of The Neighbors’ Land And Homes	71
3. The Board’s Failure To Require Buckeye Wind To Maintain An Adequate Distance Between The Project’s Wind Turbines And Neighboring	

Property Lines Would Impair The Neighbors’ Rights To Develop And Use Their Properties, Thus Taking Their Property Rights Without Compensation	79
4. The Project Will Impose Other Socioeconomic Damage On The Community	85
IV. THE MINIMUM SETBACKS RECOMMENDED BY THE STAFF ARE INADEQUATE TO MITIGATE THE ADVERSE EFFECTS OF THE PROJECT ON NONPARTICIPATING NEIGHBORS.....	86
V. IF A CERTIFICATE IS ISSUED FOR THE BUCKEYE WIND PROJECT, THE UNU INTERVENORS REQUEST A CONDITION PROHIBITING THE INSTALLATION OF SURVEILLANCE CAMERAS ON TURBINES.	90
VI. IF A CERTIFICATE IS ISSUED FOR THE BUCKEYE WIND PROJECT, THE BOARD SHOULD REQUIRE STRINGENT REQUIREMENTS TO ENSURE ADEQUATE DECOMMISSIONING OF WIND TURBINES.	91
A. The Board Should Require A Financial Assurance Bond Sufficient To Pay For Decommissioning If Demolition Costs Increase Or Scrap Metal Prices Decrease.....	92
B. The Board, Not The Applicant, Should Appoint An Independent Professional Engineer To Prepare The Cost Estimates For Decommissioning, Subject To Public Comment On The Engineer’s Selection And On The Engineer’s Decommissioning Estimates.....	95
C. Decommissioning Should Be Required If The Turbines Fall Into Disuse Or Disrepair, And The Applicant Should Be Required To Inform The Board Prior To The Expiration Of Its Bond To Ensure It Does Not Lapse	96
D. The Board Should Require Financial Assurance And Decommissioning Cost Estimates Prior To Construction.....	97
E. Buckeye Wind Should Provide Financial Assurance For Repairing Damaged Roads And Bridges	98
VII. THE BOARD SHOULD RECONSIDER A NUMBER OF ITS RULINGS ON MOTIONS AND EVIDENTIARY ISSUES	99
A. The Board Should Not Have Waived The Site Alternative Analysis Requirements	99
B. Intervenor’s Have Standing To Oppose Waiver Requests	100

C. The UNU Intervenors Had The Right To Cross-Examine The Applicant’s Representative Concerning Siting Alternatives	102
D. The Board Should Have Allowed The UNU Intervenors To Introduce The Testimony Of Dr. Michael Nissenbaum By Deposition, And His Affidavit Should Have Been Admitted Into Evidence	105
E. The Board Should Allow Discovery Of The Drafts And Preliminary Versions Of Buckeye Wind’s Application.....	107
F. Because Christopher Shears Was Not Qualified As An Expert And Lacked Knowledge On A Wide Range Of Issues On Which He Provided Opinion Testimony, That Testimony Should Have Been Stricken, And He Should Not Have Been Permitted To “Sponsor” Portions Of The Application For Which He Was Not Qualified As An Expert	108
VIII. CONCLUSION.....	114
DRAFT PROPERTY VALUE GUARANTEE AGREEMENT	EXHIBIT A
<i>Animal Welfare Institute v. Beech Ridge Energy LLC,</i> __ F. Supp.2d __, 2009 WL 4884520 (D. Md. 2009).....	EXHIBIT B

TABLE OF AUTHORITIES

CASES

Federal:

Animal Welfare Institute v. Beech Ridge Energy LLC,
__ F. Supp.2d __, 2009 WL 4884520 (D. Md. 2009)..... 64, 65, EXHIBIT B

Armstrong v. United States, 364 U.S. 40 (1960)83

Kelo v. New London, 545 U.S. 469 (2005)83

Lingle v. Chevron USA, Inc., 544 U.S. 528 (2005).....84

Penn Cent. Transp. Co. v. City of New York, 438 U.S. 104 (1978).....84

Pennell v. City of San Jose, 485 U.S. 1 (1988).....83

Pennsylvania Coal Co. v. Mahon, 260 U.S. 393 (1922).....84

Sierra Club v. Morton, 405 U.S. 727 (1972)101

Ohio:

Franklin County Reg. Solid Waste Mgt. Auth. v. Schregardus, 84 Ohio App.3d 591 (10th
App. Dist. 1992).....101

Norwood v. Horney, 110 Ohio St.3d 353 (2006)83

O’Neil v. Summit Cty. Bd. of Commrs., 3 Ohio St.2d 53(1965)83

State ex rel. Dayton Newspapers, Inc. v. Phillips, 46 Ohio St.2d 457 (1976).....101

State ex rel. Shelly Materials, Inc. v Clark County Comm’rs, 115 Ohio St.3d
337 (2007)84

Other States:

Contra Costa Water District v. Vaquero Farms, Inc., 58 Cal. App. 4th 883 (Cal. App. 1st
Dist. 1997)..... 84-85

Pittsburgh, Wheeling & Kentucky R.R. Co. v. Benwood Iron-Works, 321 W. Va. 710
(1888).....83

Administrative:

In re Adoption of Chapter 4906-17 to Implement Certification Requirements for Electric Generating Wind Facilities, Case No. 08-1024-EL-ORD (Oct. 28, 2008)54

In re Review of Chapters 4906-01 et al., Case No. 03-199-GE-BRO (July 7, 2003).....58

In the Matter of Adoption of O.A.C. Chapter 4906-17, No. 08-1024-EL-ORD, Oct. 28, 2008.....88

STATUTES

Am. Sub. H.B. 562 (2008)87, 88

R.C. § 4906.1062, 101

R.C. § 4906.10(A)(3).....69, 100

R.C. § 4906.10(A)(6)78

R.C. § 4906.13(A).....87

R.C. § 4906.20(B)(2)87

ADMINISTRATIVE MATERIALS

O.A.C. § 4906-1-03100

O.A.C. § Chapter 4906-13100

O.A.C. § 4906-13-0399

O.A.C. Chapter 4906-176, 67, 87, 88, 100

O.A.C. § 4906-17-04100

O.A.C. § 4906-17-08(C)(1)88

MISCELLANEOUS

Hoen, Ben, “Impacts of Windmill Visibility on Property Values
in Madison County, New York” (May 2006)73

Ohio Const. Art. I, Sec. 19.....83, 84

Shorter Oxford English Dictionary 2016 (1993)12

U.S. Const. Amend. V83, 84

U.S. Const. Amend. XIV83, 84

I. INTRODUCTION

This case addresses the certification of a proposed industrial wind generating facility with a physical scale unprecedented in the history of the Board. The proposed Buckeye Wind Project (“Project”) would be a vast complex of wind turbines and associated infrastructure involving 9,000 acres of leased property across six townships in eastern and central Champaign County. Application (Applic.) at 2. But that is but a fraction of the area that would be affected by the Buckeye Wind Project. The seventy proposed turbines for the Project—each up to 492 feet tall (Applic. at 10)—will dominate the landscape east of the City of Urbana and in the rural residential communities in the eastern and central portion of the county. The turbines are far taller than any existing structures in Champaign County and will be visible over 255 square miles. Direct Testimony of Julia F. Johnson (“Johnson Dir.”), UNU Exh. 1A at 4; Applic. Exh. I at 32 (turbines potentially visible over 95.5% of the visual impact study area); *id.* at 11 (study area covered 268 square miles.) *See also id.* at Figure 7 (viewshed analysis maps). Throughout much of the area proposed for the Project, residents will be confronted with views of 55 to 70 spinning, blinking turbines in what is currently an open and scenic region. *Id.* *See also* Johnson Dir., UNU Exh. 1A at 3.

Yet the dramatic visual impact of the Project pales in comparison to the effect it will have on owners of properties near the turbines. Compared to other communities hosting wind energy facilities, Champaign County has a high population density that includes not only farmers, but many retirees and commuters. *See infra* at 4. There are 2,087 structures within 1,700 meters of proposed turbine locations, and 1,004 residences within 1,000 meters. Buckeye Wind Response to Staff Interrogatory 12, UNU Exh. 43. As the Project is currently configured, many of those

residents and property owners will be subjected to distressing and unhealthy levels of wind turbine noise that will disturb their peaceful enjoyment of their properties by day and interrupt their sleep by night. *See infra* at 13. Many will be exposed to unreasonable durations of sweeping shadows across their properties and flickering, strobe-like effects in their homes. *Infra* at 59. The Project, as currently configured, would also harm or kill birds and bats, including the endangered Indiana Bat. *Infra* at 61. As a result of these and other Project effects discussed in this brief, the Buckeye Wind Project, as currently proposed, would have a profoundly detrimental effect on the well-being of the host communities and the lives of the thousands of people who would live within shadow and audible range of the turbines.

Although the Applicant has made broad claims about the economic prosperity that the Buckeye Wind Project would bring to Champaign County, the Application overlooks many significant negative effects of the Project. For example, the wind turbines will impair the value of surrounding properties. Mr. Thomas Sherick, MAI, testified that the Buckeye Wind Project would likely diminish the value of nearby vacant land by at least 6.5%, the value of nearby homes by at least 10%, and the value of nearby parcels with development potential by as much as 50%. *Infra* at 70; Sherick Dir., UNU Exh. 22A at 15. Furthermore, the Project will affect the ability of adjoining landowners to subdivide or otherwise develop their property for residential or commercial purposes. *Infra* at 79.

As the Board is aware, the State of Ohio does not have experience with industrial wind energy facilities of the scale proposed in this case. Neither does Buckeye Wind LLC or its parent, Everpower Wind Holdings (“Everpower”). To date, Everpower’s only experience in constructing and operating a wind energy facility is one 25-turbine project located on an abandoned strip mine in Pennsylvania. Testimony of Christopher Shears (“Shears”), Tr. Vol. I

20. That facility has been operational since only August of 2009. *Id.* Given this lack of experience, additional caution is warranted in reviewing the proposed Buckeye Wind Project.

The Board has the power to mitigate, to some degree, the negative effects of the Buckeye Wind Project through appropriate setbacks, measures to protect property values, and the elimination of specific turbines that pose unacceptable risks. However, for the reasons discussed herein, the Project cannot be approved as currently proposed, because the Applicant has failed to meet its burden of proof that the proposed Project satisfies the environmental and public interest criteria governing the Board's decisionmaking. R.C. § 4906.10(A)(3), (6).

From a policy standpoint, this case presents the first opportunity to apply O.A.C. Chapter 4906-17, the Board's new rules governing wind turbine generating facilities which were hotly debated by interested parties during 2008. It also marks a unique level of public interest in Board proceedings, as evidenced by the volume of the docket in this matter, the amount of testimony at the public hearing, the number of intervenors, and the reams of evidence introduced during a three-week hearing. A reasoned and fair outcome, including prudent turbine siting and appropriate impact mitigation, is critical not only to the people who will have to live with industrial-scale wind turbines on a daily basis. It is also critical to the future of the wind industry in Ohio and the attainment of Ohio's SB 221 renewable energy goals, since protracted community protests, litigation, and political intervention resulting from poor siting will undermine the predictable legal and investment environment that the industry needs to prosper.

II. CHAMPAIGN COUNTY AND THE UNU INTERVENORS

A significant element of Champaign County's identity is its beauty and open space. Johnson Dir., UNU Exh. 1A at 3. Agriculture plays a significant role economically in Champaign County, and when measured by area, much of the land in the county is agricultural.

However, Champaign County is also a bedroom community for commuters who hold jobs outside the county. *Id.*; Testimony of Thomas Sherick (“Sherick”), Tr. Vol. VI 1348. In particular, Union, Wayne, and Salem Townships—all within the proposed footprint of the Buckeye Wind project—have experienced significant residential growth since 2000. Johnson Dir., UNU Exh. 1A at 3; Applic. Exh. R at 6. *See also* UNU Exh. 9 (photographs of residences and other features in eastern and central Champaign County). The commuting distance to the Honda manufacturing facility, Wright-Patterson Air Force Base, and the urban centers of Dayton and Columbus has been a contributing factor to that growth. *Id.*; Sherick, Tr. Vol. VI 1279. However, many other residents of Champaign County have been attracted by the beauty and open space of the area. Johnson Dir., UNU Exh. 1A at 3.

In this respect, the rural residential nature of Champaign County is far different from other communities that have hosted industrial wind energy facilities. For example, Everpower’s only operational wind project to date, near Johnstown, Pennsylvania, is located on the site of a former strip mine. Shears, Tr. Vol. I 10. Another wind project venue, Benton County, Indiana, is an area of sparse, declining population with an economic base that is almost exclusively dependent on agriculture, with no significant manufacturing employment. Testimony of Leon Cyr (“Cyr”), Rebuttal Tr. Vol. II 2842-43. Benton County Commissioner Leon Cyr was not aware of any Benton County residents who commute to work in the nearest metropolitan areas of Chicago or Indianapolis. *Id.* at 2486. Furthermore, Benton County has a present population density of only 23 residents per square mile (*id.* at 2482) as contrasted with Champaign County’s growing population density of 93.4/square mile (Applic. Exh. R at 4).

Intervenor Union Neighbors United (“UNU”) is a nonprofit corporation that was formed for the purpose of promoting the safety and well-being of the Champaign County community by

addressing issues relating to the siting of industrial wind turbines. Johnson Dir., UNU Exh. 1A at 2; UNU Exh. 2. UNU consists of nine trustees and officers, all of whom reside in the area that would be affected by the Buckeye Wind Project. *Id.*; *see also* UNU Exhs. 2-8. The property boundaries of UNU members are located within 648 to 2,656 feet of proposed turbine sites. Direct Testimony of Sandra McKew (“McKew Dir.”), UNU Exh. 19A at 13-14; UNU Exh. 8. The majority of the properties of UNU members are situated within 1/3 of a mile of at least one proposed turbine site. *Id.*

Intervenors Robert and Diane McConnell reside at 4880 E. U.S. Route 36, Urbana, Ohio. Johnson Dir., UNU Exh. 1A at 11. Although the McConnells are members of UNU (Mrs. McConnell is a trustee and Mr. McConnell serves as President of the organization), Johnson Dir., UNU Exh. 1A at 2, they have also intervened individually in these proceedings. Mr. and Mrs. McConnell own a recently-constructed 4,556 square foot home situated on a lot of approximately 50 acres. Johnson Dir., UNU Exh. 1A at 11. They enjoy a fine view out large back windows toward a woods of about 17 acres. *Id.* The McConnells host equestrian events on their property and in their woods. *Id.* According to the Application, Turbines 32, 37, 39, 41, and 44 are all planned to be built within a mile behind the McConnells’ woods. *Id.* The closest turbine, Turbine 44, would be situated about 798 feet from the McConnells’ property line (McKew Dir., UNU Exh. 19A at 14), and about 1,750 feet from their home (Johnson Dir., UNU Exh. 1A at 11).

Intervenor Julia Johnson resides at 4891 E. U.S. Route 36, Urbana, Ohio. Like the McConnells, she is a Trustee of UNU but has also intervened individually in these proceedings. Her home sits on 28 acres of land bordered by woods to the south and west and by the Urbana Country Club golf course to the north and east. Johnson Dir., UNU Exh. 1A at 11. She purchased her home in 2005. UNU Exh. 7. The privacy and serenity of the property, the large

windows and natural lighting in her home, the abundant wildlife, and the space to walk outdoors with her dog are all important to Ms. Johnson. Johnson Dir., UNU Exh. 1A at 11. The expectation that she would be able to enjoy the quiet and natural setting of her home was a significant part of her decision to buy the property. *Id.* at 12.

Ms. Johnson also owns an additional 184 acres of undeveloped property adjacent to her residential property to the south and east. *Id.* The proposed site for Turbines 48 is located about 648 feet from the edge of this property, and the proposed 914' setbacks for those turbines encroach far into the property. Direct Testimony of Sandra McKew ("McKew"), UNU Exh. 19A at 14; Johnson Dir., UNU Exh. IA at 12. According to Exhibit I of the Application, Ms. Johnson will be able to see between 55-70 wind turbines from her property should the Buckeye Wind Project be constructed. Applic. Exh. I, Fig. 7 (Viewshed Analysis map, p. 1 of 2).

Since 2007, UNU, Ms. Johnson, and the McConnells (hereinafter the "UNU Intervenors") have actively educated themselves and their community concerning the implications of wind development for Champaign County and the State of Ohio. Johnson Dir., UNU Exh. 1A at 4. For example, UNU representatives Diane McConnell and Julia Johnson served as members of the Champaign County Wind Turbine Study Group convened by Champaign County Prosecutor Nick Selvaggio. *Id.* Ms. Johnson has also served as a stakeholder in the Ohio Wind Working Group, representing consumer interests. *Id.* UNU submitted extensive written comments on the Power Siting Board's wind turbine siting rules, O.A.C. Chapter 4906-17. *Id.*

The principal focus of UNU's efforts has been to advocate setbacks maintaining a safe and healthy distance between turbines and neighbors, a facet in which the Project falls woefully short. Testimony of Julia Johnson ("Johnson"), Tr. Vol. V 1186-87. Adequate setbacks are

essential to mitigate wind turbine effects that can make neighboring residents miserable, adversely affect their health, and destroy the value of their property. These effects—wind turbine noise and associated sleep deprivation, shadow flicker, hazards such as blade and ice throw, diminution of property value, and impairment of use and development of private property—are discussed in detail in Section III below.

Besides objecting to inadequate setbacks, the UNU Intervenors fear that the Buckeye Wind Project, as currently proposed, will industrialize what is currently an agricultural and residential community. Johnson Dir., UNU Exh. 1A at 4-5. A 492- foot wind turbine is far taller than any structure currently existing in Champaign County. *Id.* Concentrating 70 such turbines in eastern Champaign County would profoundly alter the open and scenic character of the landscape of that community. *Id.* The UNU Intervenors are also concerned about the negative impacts of the project on Champaign County’s tax base and economy, the impact of the project on wildlife such as the endangered Indiana bat, the hazards the project will pose to local aviation (particularly CareFlight emergency medical helicopter service), and the risk of facility abandonment without adequate decommissioning. *Id.*

III. THE BUCKEYE WIND PROJECT, AS CURRENTLY PROPOSED, DOES NOT CONSTITUTE THE MINIMUM ENVIRONMENTAL IMPACT AND DOES NOT SERVE THE PUBLIC INTEREST, CONVENIENCE AND NECESSITY.

The Applicant does its best to “green-wash” this Project, portraying it as benign, environmentally beneficial, and bringing prosperity to Champaign County. Its claims of environmental and economic benefit, however, are largely unsupported by reliable evidence. The record in this case shows a very different project—a major industrial plant spread over a rural residential landscape on a vast scale, which will impair property values, land use and development rights, local infrastructure, public health and safety, and quality of life. While the

Buckeye Wind Project may bestow financial benefit on the Applicant and a handful of leaseholders, the impact on the host community as a whole is decidedly negative.

A. **The Buckeye Wind Project As Proposed Will Have A Net Environmental Detriment.**

1. **Buckeye Wind Has Failed To Present Credible, Admissible Evidence That Its Wind Power Production Will Improve Air Quality By Replacing Energy From Sources Of Higher Emissions Such As Coal-Fired Power Plants.**

Buckeye Wind makes sweeping, exaggerated claims that its proposed Project will improve air quality by displacing between 299,174 and 415,520 tons of carbon dioxide emissions per year, depending on the rated capacity of the turbines. Applic. at 76. These claimed emission offsets are the crux of Buckeye Wind's case that the Project will yield a net environmental benefit. For the following reasons, however, these claims are not supported by reliable and probative evidence.

First, Buckeye Wind's claims of emission offsets were not supported at hearing by live testimony of a witness with knowledge of the basis of those claims. Although Mr. Christopher Shears of Everpower "sponsored" the portions of the application in which the emission offset claims were discussed (Tr. Vol. II 368), he did not personally make the emission offset calculations. Shears, Tr. Vol. I 31. The calculations were made by EDR, Buckeye Wind's consultant. *Id.* Mr. Shears did not know specifically how EDR calculated those numbers. *Id.* at 33, 36. The Applicant called no witnesses from EDR to attest to the basis for the emission offset claims, but instead relied solely upon Mr. Shears to sponsor EDR's work. Over the objections of UNU and Champaign County that Mr. Shears was not qualified to do so (*e.g.*, Tr. Vol. I 364), Mr. Shears' testimony on emissions offsets and the corresponding portions of the Application were admitted into evidence. As discussed more fully in Section VII(F) of this brief, the

admission of this information into evidence was error and unlawfully reversed the burden of proof in these proceedings.

Second, although Mr. Shears testified that the claimed emissions offsets were based on an “emission factor,” he could not specify what that emission factor was or how it was derived. Shears, Tr. Vol. I 32. Counsel for the UNU Intervenors was barred from asking Mr. Shears to calculate that emission factor. Shears, Tr. Vol. I 40. Nonetheless, the emission factor can be determined from Table 06-2 of the application to be 819 g/KWh.¹ Ironically, this is nearly twice the offset emission factor currently used by Mr. Shears’ former organization, the British Wind Energy Association (“BWEA”). UNU Exh. 35. In fact, in October of 2007—shortly after Mr. Shears’ departure as Chairman of the BWEA (Shears, Tr. Vol. I 41)—the BWEA reduced its offset emission factor from 860 g/KWh to 430 g/KWh. This reduction was in response to a determination by the UK’s Advertising Standards Authority that the former emission factor was “no longer representative of the UK electricity generation mix.” UNU Exh. 35.

Third, the emissions offsets claimed in Application Table 06-2 are based on the displacement of predominately coal-fired sources, but Buckeye Wind has introduced no evidence to prove this claim. Shears, Tr. Vol. I 50. Mr. Shears testified that the offset claims in Table 06-2 were based on emissions from the “energy mix in Ohio and the assumption [that] we’re displacing that with the generation from the wind farm.” *Id.* at 33. But to use an average utility mix for Ohio misrepresents the nature of the emissions that would be displaced by the Project. The electricity generated from the Project will not be confined to Ohio, nor is Ohio constrained to use electricity generated within its borders. *Id.* at 51. Mr. Shears did not know the broader average energy mix for the Midwest or for the PJM grid. *Id.* at 34. Furthermore, he

¹ According to Table 06-2 of the Application, a project utilizing 70 1.8MW turbines would yield 331,128 MWh/year, resulting in annual CO2 offsets of 299,174 tons/year. Dividing tons/year by MWh/year yields .903 tons/MWh, or .000903 tons/KWh. The metric equivalent is 819 g/KWh.

acknowledged that in order to determine which energy sources would truly be displaced by the Project, it would be necessary to analyze the energy dispatch process² in the power pool on an hour-by-hour basis. *Id.* at 49-50. Because the process of power pool dispatch selects energy resources on the basis of cost (*id.* at 48), it is unlikely that a 175 MW wind power project will displace larger, low-cost power sources such as coal-fired power plants. If wind power displaces any conventional power generation, it is far more likely to displace higher cost sources.

According to Mr. Shears, the highest-cost sources in the PJM power pool are oil-fired, natural-gas fired, and hydroelectric facilities. *Id.* at 49-51. All of these energy sources emit fewer emissions than coal-fired power plants. Ironically, hydroelectric power is emission-free, as is nuclear power, another high-cost power source that would be displaced by the Buckeye Wind Project. Buckeye Wind has overestimated the emission reductions, if any, attributable to its wind project.

Finally, Buckeye Wind's emission offset claims rely on an unsupported "capacity factor" for the Project. Shears, Tr. Vol. I 85. Capacity factor is a measure of the available time that a wind turbine is generating, compared to what it might be generating if it were operating at full output throughout the year. *Id.* at 84. Capacity factor is a function of the available resources and the power curve of the turbine in question. *Id.* Different turbines generate different percentages of their full rated capacity at different wind speeds; some turbines are designed for very low wind speed locations, while others are designed for high wind speeds. *Id.* Understanding the available wind resources is therefore essential to developing a capacity factor. And because the capacity factor allows one to predict the annual power output from a wind power facility, it is

² The energy dispatch process is the continual process of determining which sources' electricity will be accepted to the grid.

also key to estimating the putative environmental benefit of the facility (*i.e.*, the emissions offset). *Id.* at 85.

Buckeye Wind claims its Project will have a capacity factor of “greater than 30%.” *Applic.* at 2. For the following reasons, however, the factual basis for that claim is doubtful.

As noted above, capacity factor is partly a function of the available wind resources. Mr. Shears indicated that Everpower measured wind resources from three anemometer towers, two at a height of 60 meters and a third at a height of 80 meters. *Id.* at 78-79. One of the 60 meter anemometer towers is located outside the bounds of the Buckeye Wind Project as currently proposed. *Id.* at 79. The two within the footprint of the Project have been in place less than two years. *Id.* at 80.

Mr. Shears stated that it is necessary to actually measure wind resources, instead of simply relying on National Weather Service data, because it is important to understand the wind shear conditions at the planned hub height of the turbines. *Id.* at 85-86. Although one can normalize or calibrate wind data from a lower elevation to predict the wind resources at the target hub height, Mr. Shears stated that such assumptions do not provide the level of accuracy that wind developers require. *Id.* at 87. Yet, although Buckeye Wind plans to install turbines with a 100-meter hub height, it took no wind measurements at 100 meters. Although Mr. Shears excused this defect by stating that they could extrapolate their 80 meter data to 100 meters, this contradicts his later statement that they cannot obtain the required degree of accuracy from such assumptions. *Id.* at 86-87.

When asked specifically about the wind resource measurements from the anemometer towers, Mr. Shears stated that those measurements were within “an order of magnitude” of mesoscale wind data provided by AWS Truewind. *Id.* at 91. AWS Truewind estimated the local

average wind speed at 100 meters to be between 7 to 7.5 meters per second. *Id.* Despite Mr. Shears' disclosure, however, the Applicant balked at providing its specific average wind measurements from its anemometer towers and the Administrative Law Judges ("ALJs") barred the UNU Intervenors from pursuing that issue further on cross-examination. *Id.* at 92-93. If Everpower's own average wind calculations were truly consistent with the AWS Truwind data, as Mr. Shears suggested, then the Applicant would not have been further prejudiced by providing its own wind resource calculation. After all, the AWS Truwind data predicted average wind speeds within a very narrow range (0.5 meters per second). *Id.* at 91. Instead, Mr. Shears would only admit that its own calculations were within an "order of magnitude" of the AWS Truwind figures. *Id.* at 91. But since the term "order of magnitude" usually means within a range between one power of ten and the next (*Shorter Oxford English Dictionary* 2016 (1993)), Mr. Shears' concession is by no means probative. It was error to bar questioning of Mr. Shears concerning Everpower's own data from its wind resource calculations in the Project area. Without such evidence, the Applicant's capacity factor claims—and the emission offset estimates derived from those claims—are unproven. Thus, Buckeye Wind has failed to sustain its burden to prove the Board the emission offset estimates, and they may not be used to support Buckeye Wind's claims that the Project constitutes the minimum environmental impact or serves the public interest, convenience, and necessity.

2. **The Buckeye Wind Project As Proposed Will Cause Serious Discomfort, Sleep Deprivation, And Health Issues.**
 - a. **To Prevent Sleep Deprivation, Annoyance, And Health Problems From Inherently Intrusive Wind Turbine Noise, The Board Should Not Allow Buckeye Wind To Increase The Noise Levels Imposed On Nonparticipating Neighbors Of The Wind Project By More Than Five dBA Above The Background Sound Level.**

To prevent Buckeye Wind's wind project from seriously damaging the health and comfort of the community, Board must carefully scrutinize and correct the Buckeye Wind noise impact assessment that grossly underestimates the noise impacts on the project's neighbors. While Buckeye Wind's project poses many major problems for the well-being of the community, no issue is more critical than this one.

If a new noise is no louder than the existing sound level in a community, the background sound may mask or obscure the new noise. Applic. at 90. Consequently, it is vital to accurately calculate the sound levels for both the existing background sources and the new noise source. David Hessler of Hessler Associates, Buckeye Wind's noise consultant, made significant errors in calculating both background sound and projected turbine noise, as revealed in his cross-examination and the testimony of the UNU Intervenors' noise consultant, Richard James. Unless corrected, these errors will inflict thousands of neighbors with physical and mental discomfort, property impairment, and loss of health.

Buckeye Wind's application acknowledges that the commonly accepted practice for preventing unacceptable impacts from a new noise source on neighbors is to limit the noise increase to five A-weighted decibels ("dBA") above the measured ambient background sound level, calling it a "reasonable design target." Applic. at 25; Applic. Exh. K at 22. Acoustical engineers regard a five dBA or lower increase from a new noise source as an acceptable impact,

because sound increases below this threshold usually are unnoticed to tolerable. Direct Testimony of Richard James (“James Dir.”), UNU Exh. 31A, Answer (“Ans.”) 25.

The goal of limiting new noise to five dB over background is to prevent community noise complaints and nighttime sleep disturbance. James Dir., UNU Exh. 31A, Ans. 34. This five dBA increase is the point at which 10% of the exposed population will be annoyed. *Id.* at Ans. 35.

This principle was developed in studies of noise sources, such as highways, rail, airplane, and industrial noise sources common in suburban and urban residential communities. James Dir., UNU Exh. 31A, Ans. 34. The purpose of these studies was to establish the relationship between annoyance and sound level. *Id.* The studies confirmed that, as the background sound levels increased, the tolerance for new nighttime noise also increased. *Id.* This design approach is “very common” for wind power projects as well as for other types of noise-producing projects. Testimony of David Hessler (“Hessler”), Tr. Vol. III 826. As Buckeye Wind admits, this approach “is a sensible balance between the interests of all parties” that allows viable wind projects to be sited while avoiding noise “so loud that it leads to legitimate disturbance at a large number of homes.” *Applic.* at 93.

Buckeye Wind discloses that other states such as New York limit the noise from new wind projects to an increase of five dBA over background level, a fact that Mr. James has confirmed. *Applic.* at 93; James Dir., UNU Exh. 31A, Ans. 26. Local communities in the United States also use this standard as the basis for their limitations on wind turbine noise. James Dir., UNU Exh. 31A, Ans. 26. An $L_{A90} + 5$ dBA standard is used in standards for the United Kingdom., Ireland, Netherlands (rural night 30 dBA), New Zealand, France (night L_{A90}

+3 dBA and +5 dBA daytime). James Dir., UNU Exh. 31A, Ans. 26.³ While some jurisdictions use a more lenient standard, their laxity has led to the widespread discomfort, property damage, sleep deprivation, and health problems described in the testimony of Richard James, Larry Wunsch, and Rene Taylor, and studies by Pedersen, Harry, and others.

An increase above five dBA is intrusive, and causes sleep disturbance if occurring at night. James Dir., UNU Exh. 31A, Ans. 25. Such a noise source operating night after night leads to sleep deprivation. *Id.* Chronic sleep disturbance is frequently associated with night time noise levels more than five dB above the natural background sound levels of a community. *Id.* This is especially true when the new noise source emits sounds that are dissimilar to the host community's natural nighttime sounds or when it produces fluctuating sound levels. *Id.* This effect would not be considered surprising for anyone who has experienced the sleep disturbing effects of sounds like a dripping water faucet near a bedroom. *Id.*

Wind turbine noise is dissimilar to the host community's natural nighttime sounds and is more noticeable due to its fluctuation. *Id.* Although sound increases up to five dBA are tolerable from most noise sources, noise increases attributable to wind turbines are more noticeable. While Buckeye Wind states that a five dBA increase is the level at which sound generally "begins to be perceptible to most people," Buckeye Wind acknowledges that this applies only to a steady sound without any distinctive character such as tonality or impulsiveness. *Applic.* at 92; *Applic. Exh. K* at 21. For that reason, it is unfair to compare the decibel level of turbine noise with sources of steady noise, such as refrigerators, busy offices, or conversational speech. (Not to mention that even such steady noises may be difficult to sleep through, as Dr. Mundt admitted. *Mundt, Tr. Vol. II* 481-82.)

³ The L90 is described later in this brief.

Consistent with this principle, Buckeye Wind admits that wind turbine noise is perceived below five decibels above background due to its amplitude modulation. Applic. at 92-93; Applic., Exh. K at 21-22. Amplitude modulation is the rise and fall of noise levels, which wind turbines create in about one second intervals as the blades turn. Applic. at 92; Applic. Exh. K at 21.

Moreover, unsettled air and gusty winds increase noise from the turbine rotors. Applic. Exh. K at 28. In addition, turbines often produce a swishing sound that increases noise perceptibility. *Id.* These characteristics make wind turbine noise more noticeable, and more annoying.

Consequently, Mr. Hessler's report (Application Exh. K), correctly stresses that wind turbines can be heard at levels less than five dBA over background. *Id.* at 22. Indeed, Mr. Hessler's report emphasizes that "wind turbines can commonly be discerned at fairly large distances even though the actual sound level may be relatively low and/or comparable to the magnitude of the background level." *Id.* at 28. The conclusion of Mr. Hessler's report summarizes the importance of what it characterizes as conservative assumptions to predict noise levels, since "atmospheric conditions, temperature gradients and wind shear gradients" will make wind turbine noise higher than predicted. *Id.* at 33. Accordingly, given that noise increases will harm the community's quality of life even below five dBA, Buckeye Wind's turbines must not be allowed to increase the community's noise by more than five dBA.

b. To Determine The Intrusiveness Of Wind Turbine Noise, The Ambient Background Sound Level Must Be Measured Accurately To Determine Existing Noise Levels.

To accurately determine how much of the turbines' noise will be masked by a community's normal background sound, the background sound level must be measured in an

accurate, meaningful manner. While Buckeye Wind refers to the L90 method for calculating background sound as a “conservative or worst-case” scenario (Applic. at 90), Mr. Hessler testified that this is the appropriate means to evaluate the actual impact of a noise source on the neighborhood. Hessler, Tr. Vol. III 824; UNU Exh. 62 (describing the opinion of David Hessler’s father, George Hessler of Hessler Associates, that the L90 is a good method for measuring background noise)⁴.

Thus, for good reason, Buckeye Wind defines the relevant background level as the L90.⁵ The L90 background level is the sound level normally exceeded during 90% of the time in a community, as measured in 10 minute intervals. Applic. at 90. The L90 filters out sporadic, short-duration noise events in order to measure the quieter intervals when turbine noise is more likely to be heard. *Id.* Filtering out short-term sound spikes is necessary, because they do not provide a consistent and continual masking noise to obscure turbine noise. Applic. Exh. K at 10; Hessler, Tr. Vol. III 725-26. That is, the turbines can be heard between short-duration noises such as passing cars. Applic. Exh. K at 10. Consequently, a background level is useful in determining turbines' intrusiveness only if it identifies the background sound level at the times the turbines are most likely to be heard.

Richard James recorded the noise levels in the Buckeye Wind project area utilizing recording techniques commonly accepted by acoustical engineers. Testimony of Richard James (“James”), Tr. Vol. VI 1402. The objective of these techniques, as developed by the acoustical experts of the American National Standards Institute (ANSI), is to identify the community's sound level in the absence of short-term noise spikes. *Id.* at 1402-1403. According to ANSI,

⁴ Any reference in this brief to “Mr. Hessler” refers to David Hessler.

⁵ Sometimes this concept is expressed as “LA90,” which means the L90 for A-weighted (dBA) noise. Hessler, Tr. Vol. III 724. “LC90” is the L90 for C-weighted noise.

such a test can be accurately performed in 60 minutes or less if an engineer is present to identify and exclude short-term noise spikes from the sound measurements. *Id.* Mr. James found the average background sound level of the community to have an L90 of 27 dBA. James Dir., UNU Exh. 31A, Ans. 37. This level is consistent with those commonly found in quiet rural communities, where background sound can be lower than 18 dBA. *Id.* at Ans. 39.

Buckeye Wind claims that the background sound level of the community is higher than Mr. James found. Buckeye Wind claims that the L90 levels are 35 dBA at a wind speed of six meters per second during daytime and 29 dBA at a wind speed of five meters per second at night. *Applic.* at 95.

Nevertheless, even Mr. Hessler's measurements reveal a very quiet community. Figure 2.5.2 of Mr. Hessler's report shows that the L90 readings in the project area stayed below 29 dBA for large periods of time just about every night. *Applic.* Exh. K at 12. Many of the readings approached or even dipped below 20 dBA. *Id.* So these quiet times, which Buckeye Wind misleadingly characterizes as the "worst-case" scenario, actually occur during every 10 minute interval during these lengthy nighttime periods. While Buckeye Wind attempts to minimize the importance of L90 readings by observing they occur only 10% of the time, they actually occur continuously throughout the night. In fact, the L90 levels stayed under 29 dBA for entire nights during Mr. Hessler's background study. Hessler, Rebuttal Tr. Vol. I 2339-40. Over a 10-minute interval, the background sound can dip below the L90 as many as 10 times. Hessler, Tr. Vol. III 827. Thus, at nighttime levels more than five dBA above Mr. Hessler's L90 background, a wind turbine has the potential to awaken the neighbors every 10 minutes, or keep them awake during the entire time.

While Buckeye Wind admits that the L90 is the appropriate method for measuring background sound, Buckeye Wind constantly refers to the Leq as the “typical” sound level. Mr. Hessler’s report, incorporated into Buckeye Wind’s application, consistently errs in attempting to justify its small setbacks by referring to Leq sound levels. James Dir., UNU Exh. 31A, Ans. 55. In his rebuttal testimony, Mr. Hessler even went so far as to suggest an “operational mean standard” of 45 dBA for the Buckeye Wind project. Hessler Rebuttal Dir., Applicant Exh. 26 Ans. 13. However, Buckeye Wind has admitted in both its application and its representatives’ testimony that background sound must be calculated pursuant to the L90, not the Leq. Hessler, Tr. Vol. III 824.

An Leq is the average sound level during each measurement interval. Applic. at 90; Hessler, Tr. Vol. III 726. A simple exercise in averaging illustrates that an average is hardly typical of the averaged numbers. James Dir., UNU Exh. 31A, Ans. 55. For example, while the average of the numbers 1 and 100 is 50, 50 is not typical of either 1 or 100. Including short-term noise events such as passing cars would greatly skew the sound measurements. Hessler, Tr. Vol. III 726. For this reason, and as explained in a paper written by David Hessler’s father, the Leq is a poor metric to use for evaluating background noise. UNU Exh. 62; Hessler, Tr. Vol. III 824-26.

Since the wind project’s neighbors will be able to hear wind turbine noise exceeding background levels, accurately establishing the background sound level is critical to siting Buckeye Wind’s project without jeopardizing the health and comfort of its neighbors. Nevertheless, Mr. Hessler’s methodology for recording background sound can most charitably be characterized as unorthodox. Mr. Hessler acknowledged that respected acoustical experts in such organizations as ANSI and the International Standards Organization (ISO) have formulated

practices generally accepted for accurately recording sound. Hessler, Tr. Vol. III 727-28.

Nevertheless, he disregarded these standards in recording the background sounds of the project area.

One of these acoustic standards, ANSI standard S12.9, advises acoustical engineers not to place their sound recording instruments within 1.5 meters of trees, posts, and other reflecting objects with small dimensions, because reflections from them may inaccurately enlarge the recorded sound. UNU Exh. 55 at 4; Hessler, Tr. Vol. III 737-39. Attaching sound recorders to such objects is not only inadvisable, but unnecessary, since they can be placed on a tripod. *See* Paul Schomer's paper, marked as UNU Exh. 56, showing a typical sound recording station with the instrument on a tripod. *Id.* at 744; UNU Exh. 56. Nonetheless, every sound recording instrument at Mr. Hessler's nine recording sites was attached to a post, pole, or tree. Applic. Exh. K at 2-6; Hessler, Tr. Vol. III 732-39. Confronted with evidence that his methods did not comply with the ANSI standard, Mr. Hessler could only say that he disagreed with the standard. *Id.* at 739.

Mr. Hessler also made no effort to ensure that farm animals in this farming community were not making noise near the recording devices during his background sound study and even placed some recorders on livestock fences. *Id.* at 733, 735, 737. Because he was not present while the recordings occurred, so far as he knew there could have been a "whole herd" inside one of the fences he used for his devices. *Id.* at 733. Recorders were also placed next to wires, where birds could sing into them and skew the sound measurements. *Id.* at 740, 742. The morning bird chorus can spike sound levels as high as 45 to 50 dBA if the birds sing next to the microphone. James, Tr. Vol. VI 1409. Mr. Hessler placed some sound recording devices next to roads, even a state highway, where vehicles could augment the recorded noises. Hessler, Tr.

Vol. III 734, 745, 747. These questionable practices increased the volume of Mr. Hessler's sound readings. James, Tr. Vol. VI 1370.

Mr. Hessler acknowledged that the possible contamination of his noise recordings by loud noises from vehicles, livestock, and birds necessitated the use of L90 calculations to delete these short-term spikes in noise from his background readings. Hessler, Tr. Vol. III 741-42. Such events made the use of Leq calculations inappropriate to calculate background sound levels. *Id.* at 742, 748-49.

Because Mr. Hessler has flouted the necessary acoustical practices in his study of the community's background sound level, the Board should not accept his questionable calculations. Since Mr. James conducted his study in accordance with respected acoustical practices, the Board should use calculations of an average nighttime background sound level of 27 dBA.

Having found a quiet community despite his efforts to skew the noise readings, Mr. Hessler relied on another argument to contend that background sound will mask noise from the Applicant's wind project. He postulated that both the wind and turbines are noisier at higher wind speeds and thus that wind noise will mask the noise from the turbines even at their noisiest levels. *Applic.* at 94-95. He admitted that no scientific or engineering literature supports this hypothesis. Hessler, Tr. Vol. III 802.

Nevertheless, he attempted to demonstrate a correlation between wind speed and background noise to justify his hypothesis that background noise is higher when wind speeds are higher. To do so, he estimated the wind speeds occurring during his background sound measurements using wind speed readings from two anemometers somewhere in the project area. *Id.* at 797; *Applic. Exh. K* at 9. Although Mr. Hessler admitted that the wind speed near surface cannot be extrapolated from wind speeds at higher elevations, he still utilized the data from these

anemometers at a height of 40 meters above ground elevation to measure ground level wind speed. *Id.*; Hessler, Tr. 795. The inadvisability of this procedure is further betrayed by Mr. Shears' testimony that wind speed measurements at one elevation are not useful for estimating wind speed at another elevation. Shears, Tr. Vol. I 83-85. To accurately measure the wind speed at ground elevation where the noise recordings were made, Mr. Hessler should have recorded the wind speed at the surface rather than at 40 meters above ground elevation.

The inapplicability of the anemometer data to ground level wind speed is demonstrated by Mr. Hessler's own graph on page 14 of Application Exhibit K, Mr. Hessler's report on his noise study. While the application represents that this graph portrays the correlation between wind speed and background sound, it actually shows that there is no correlation. If higher wind speed truly caused louder noise, the graph would consistently show simultaneous upward spikes in wind speed and noise. Instead, for much of the time, the graph shows the background noise and wind speed spiking in opposite directions. Thus, for example, for most of January 12, 2008, the background sound shown in the upper line of the graph was spiking upward while the wind speed in the lower line was heading downward. The same relationship occurred on January 13, 14, 16, 17, and 18, 2008. On January 20, 2008, wind speed decreased while background noise increased. Consequently, this graph demonstrates a lack of correlation between wind speed and background sound.

Having failed to show a meaningful correlation between background noise and wind speed in the graph, Mr. Hessler made another attempt to establish such a relationship by employing the regression analyses displayed on pages 15 and 19 of Application Exhibit K. The regression analyses plotted the wind speeds and background noise levels on a graph and then drew a line purporting to show that noise levels and wind speed increased simultaneously. Based

on these regression analyses, Mr. Hessler concluded that the maximum difference between L90 background and turbine noise will occur at wind speeds of six meters per second in daytime and five meters per second at night. *Applic.* at 95; *Applic. Exh. K* at 24-25, Figures 3.3.1 and 3.3.2; *Hessler, Tr. Vol. III* 786-87, 788.

However, Mr. Hessler admitted that the regression analyses demonstrate no, or at most, “little,” correlation between background noise and wind speed under five meters per second. *Hessler, Tr. Vol. III* 815-16. If a regression line were drawn for just those wind speeds, it would be flat. *Id.* If higher wind speeds at high elevations actually cause more noise near the ground, the background noise at ground elevation would be expected to rise as the wind speed climbed from zero to five meters per second. *Id.* at 815.

There is only one logical explanation for the lack of correlation at these wind speeds, and it reveals the fallacy of Mr. Hessler’s regression analyses. ANSI Standard S12.18 unequivocally warns that winds over five meters per second distort the sound recorded in a microphone, thus making the noises appear louder than they actually are. *UNU Exh. 61* at 5, 7, 9; *Hessler, Tr. Vol. III* 808-12. The ANSI standard specifies that noise data collected during wind conditions exceeding five meters per second is inaccurate and must be discarded. *UNU Exh. 61* at 6; *Hessler, Tr. Vol. III* 812. As with the other engineering standards he disregarded in the Buckeye Wind Project, Mr. Hessler could only say that he disagreed with this respected industry standard.

In this case, Mr. Hessler opined that a wind tunnel test he had performed showed the ANSI standard to be inapplicable. *Id.* However, no acoustical engineering standards body, including ANSI, has accepted his study or changed its standards to incorporate the results of the study. *Id.* Apparently, Mr. Hessler believes his findings are more accurate than the collective wisdom of the acoustical experts widely accepted in his profession. As shown by ANSI S12.18,

Mr. Hessler's regression analyses purport to show a correlation between background noise and wind speeds above five meters per second only because the background noise included microphone distortion. In reality, the regression analyses fail to prove higher wind speeds mask any increase in turbine noise attributable to those higher wind speeds.

Relying on Mr. Hessler's faulty regression analysis, Buckeye Wind contends that the ground level wind speed increases whenever the wind speed increases at the turbines' hubs (the center of the turbine's rotor holding the blades). Thus, Buckeye Wind asserts that the whistling and rustling noises from wind at ground level will substantially mask the maximum turbine noise levels at hub height even though the turbines make more noise at higher wind speeds. *Applic.* at 94-95. The manufacturers' data shows that at night the Repower MM92 turbine produces 101.6 dBA at a normalized wind speed of five meters per second, and 105 dBA at eight or more meters per second, a difference of 3.4 dBA. *Applic. Exh. K* at 25, Table 3.3.2. Despite this difference and based on his regression analysis, Mr. Hessler contends that turbine noise is most noticeable at a normalized wind speed of five meters per second at night, even though the turbines are louder at higher wind speeds. *Id.* Based on this faulty premise, he concluded that ground elevation wind noise masks more noise at higher wind speeds than at five meters per second at night. *Id.* He made a similar assumption about daytime noise, for which there is a 1.4 dBA difference in turbine noise between a normalized wind speed of six meters per second and higher wind speeds. *Applic. Exh. K* at 24, Table 3.3.1.

Buckeye Wind thus concludes that the maximum turbine sound level cannot be compared to the background sound level on a calm night. *Applic.* at 94-95. However, while wind speeds at ground level and hub height sometimes increase simultaneously, at other times the wind conditions remain calm at ground level while high wind speeds at hub height rapidly turn the

turbines. In fact, even Mr. Shears understood that high altitude wind speeds cannot be correlated with wind speeds at lower altitudes. Shears, Tr. Vol. I 83-86. In these cases, the ground level winds do not mask the loud turbine noise.

Revealingly, Mr. Hessler was not familiar with a study by Clifford Schneider demonstrating that wind turbines frequently have enough wind at hub height to operate even during calm wind conditions of two meters per second or less at ground level. UNU Exh. 63 at 5; Hessler, Tr. Vol. III 830. Mr. Hessler thus was unaware that the condition that Mr. Schneider observed, known as the “stable atmospheric condition,” occurs during one of every three nights from June through October. UNU Exh. 63 at 5, Table 2. He thus was also unaware that Mr. Schneider had found that these calm ground conditions failed to mask wind turbine noise, exposing the residents to excessive noise annoyance and sleep deprivation. *Id.* at 2. Since Mr. Hessler’s assessment of noise impacts are based on the assumption that higher wind speeds at ground elevation mask turbine noise, he should have been aware that testing data from the Schneider study disprove this assumption. Mr. Hessler’s failure to even know about this study reflects negatively on his credentials to express any credible opinion about this topic.

In a proffer after Mr. James’ testimony about Mr. Schneider’s study was precluded (Tr. Vol. VI 1465-66), Mr. James testified that Mr. Schneider is a respected acoustical engineer formerly employed by the State of New York. James, Tr. Vol. VI 1467. He further testified that Mr. Schneider’s study discovered that stable atmospheric conditions with calm ground conditions and windy hub height conditions occur 67% of the time during the summer season. *Id.* at 1469-70. For this reason, Mr. Hessler erred in assuming that ground elevation wind noise will mask turbine noise at high wind speeds. *Id.*

Mr. Schneider's report and Mr. James' testimony about it should have been admitted into evidence during the hearing, based on Mr. James' familiarity with the report and its author. However, the record contains ample evidence about the occurrence of stable atmospheric conditions even without the report. In fact, Raymond Strom, the Board's Staff member assigned to evaluate noise, agreed that these conditions occur even though Buckeye Wind failed to discuss these conditions with him during the application process. Strom, Tr. Vol. VIII 1910-12.

In addition, Mr. Hessler admitted that high wind speeds can exist at turbine hub height even when ground conditions are calm, a condition he called stratification. Hessler, Tr. Vol. III 829-30. In fact, he emphatically stated that there is "[n]o question that happens." *Id.* at 829. He acknowledged that this condition occurs when the land begins to cool at sunset, and calm ground level winds are de-coupled from winds aloft. *Id.* at 832. Besides admitting the occurrence of calm conditions at ground level during stable atmospheric conditions, Mr. Hessler also revealed that wind speeds at ground level do not correlate to wind speeds at turbine hub height "during temperature inversions and other atmospheric conditions." Applic. Exh. K at 20; Hessler, Tr. Vol. III 828-29. For these and other reasons, Mr. Hessler's report admits that, notwithstanding his characterization of his methods as conservative, the actual noise imposed on the neighbors at times will exceed the noise levels predicted by his modeling and depicted in plots 2A, 2B, 2C, and 2D. Applic. Exh. K at 28; Hessler, Tr. Vol. III 837.

The Kamperman/James treatise on wind turbine noise also describes this stable atmospheric condition. UNU Exh. 32. It explains that the ground cools after sunset, and the lower level atmosphere can separate from the higher level atmosphere. *Id.* at 17. Then the winds at the ground are calm while wind at the turbine hub is strong. *Id.* Consequently, no ground level wind noise is present to mask the sound of the wind turbines, which can be operating at or

close to full capacity. *Id.* at 16-17. This condition is "frequent" and is the major cause of complaints from neighbors of wind projects. *Id.* at 16.

Rene Taylor, a resident near a wind project in Illinois, provided personal verification of this condition. She testified that she has experienced many occasions at night at which the turbines produced excessive noise even though no wind was blowing at ground surface. Direct Testimony of Rene Taylor ("Taylor Dir."), UNU Exh. 65 at 3.

In summary, Mr. Hessler made three egregious errors leading to his false assumption that background wind noise levels at ground elevation will substantially mask the turbines' noise. First, he skewed the results of his background noise study by placing his sound recorders where they would record noise higher than the community's typical noise level. Second, his regression analyses use noise readings falsely elevated by microphone distortion to convey the inaccurate impression that wind noise at ground elevation is loud enough to mask turbine wind noise at hub height. Third, he wrongly assumes that high winds at turbine hub height will, except on rare occasion, be masked by strong winds at ground elevation. Buckeye Wind's application relies on these errors to contend that ground elevation winds will minimize the residents' ability to hear the noise from its turbines. These errors wrongly minimize Buckeye Wind's predictions about the degree of discomfort the wind turbines will impose on the community.

c. **To Accurately Evaluate Noise Impacts On The Community, The Predicted Noise Produced By The Wind Turbines Must Be Accurately Calculated.**

To compare its anticipated wind turbine noise to background sound levels, Buckeye Wind must use a noise model to predict the noise output from the wind turbines to be constructed. The Board's Staff was unable to verify the accuracy of Buckeye Wind's noise model prior to the hearing because the Staff does not possess the necessary modeling software or acoustical engineering expertise. Strom, Tr. Vol. VIII 1856, 1871-72, 1878-79. Nor did Buckeye Wind or its noise consultant disclose any of the uncertainties or errors of their noise model during the application process. *Id.* at 1924-25; Hessler, Tr. Vol. III 764. However, the hearing testimony of Mr. James and Mr. Hessler has now provided the Board with more guidance on these issues. This testimony reveals that Buckeye Wind's noise predictions are substantially under-estimated due to flaws in Buckeye Wind's modeling.

To model the project's noise, Buckeye Wind utilized the wind turbine manufacturer's measurements of sound levels from Repower MM92 turbines conducted in accordance with IEC standard 61400-11. *Applic.* at 94. Buckeye Wind calls its use of Repower MM92 noise specifications as "worst-case," because this model is noisier than the Nordex N90 model. *Applic.* at 93-94.

Buckeye Wind's application declines to specify the model of the turbine it will select for the wind project, claiming that presently it is premature to make this decision. *Applic.* at 10. However, Buckeye Wind has identified the Nordex N100, Nordex N90, and Repower MM92 as turbine models suitable for the project, and has represented that the ultimately selected model will be "similar in design, appearance, and operating characteristics." *Id.* Thus, Buckeye Wind

has left itself the option of selecting any of the three named turbine models or any other model it finds to be similar.

Mr. Hessler acknowledged that his noise model underestimates the noise from a wind project if Buckeye Wind selects a turbine model that is noisier than the turbine model he studied. Hessler, Tr. Vol. III 767. Accordingly, he emphasized the importance of evaluating the noise from the noisiest turbine under consideration. *Id.* at 767.

The Nordex N100 is the noisiest of the three turbine models identified in Buckeye Wind's application. *Id.* at 772-73; UNU Exh. 58; Applic. Exh. K at 23. Depending on the wind speed, the Nordex N100 is noisier than the Repower MM92 by two to three decibels. Hessler, Tr. Vol. III 773. Incredibly, Buckeye Wind did not tell Mr. Hessler about its potential use of the Nordex N100 while he was performing his noise study. *Id.* at 769-71. In fact, Mr. Hessler was not aware of this fact until cross-examination. *Id.* at 769. Consequently, Mr. Hessler's noise study did not evaluate the effects that the noise from this noisier model would have on the community. Nor did Mr. Hessler consider the noise impacts from any of the unnamed models that Buckeye Wind might use, given its failure to identify the model it will use. Mr. Hessler testified that, if the Nordex N100 is used, his model would be invalid and would have to be rerun. Hessler, Rebuttal Tr. Vol. I 2365, 2369.

Mr. Hessler attempted to shrug off this gaffe by asserting that he did not think Buckeye Wind is likely to use the Nordex N100. *Id.* at 2370. However, Buckeye Wind's application discloses that Buckeye Wind is serious about considering the Nordex N100 as its turbine model. For example, Buckeye Wind uses the Nordex N100 to illustrate the availability of turbines that can withstand high wind speeds without collapsing. Applic. at 36. Moreover, Buckeye Wind made no promise at the hearing to abandon the turbine model. Nor has Buckeye Wind made any

commitment to limit its selection to the three models identified in the application. Consequently, Mr. Hessler's noise model does not predict the noise level for any turbine other than the Repower MM92.

Adding to the uncertainty of the noise level predicted for the Repower MM92 are the uncertainty factors in the testing used by the manufacturer. These predictions could be off by 1.4 to 1.6 decibels, according to Mr. Hessler, or 2.0 decibels, according to Mr. James. Hessler, Tr. 776; James, Tr. Vol. III 1394-95.

Using noise specifications for the Repower MM92, Mr. Hessler utilized the Cadna/A version 3.7 sound model to predict how much of the turbines' noise will reach neighboring homes. Applic. at 96; Applic. Exh. K at 26. Mr. Hessler's report states that this sound model is an automated version of ISO Standard 9613-2, which is "the primary worldwide standard for such calculations." *Id.*

Using this sound model, Mr. Hessler modeled the turbines as point sources at a height of 80 meters above ground elevation. Applic. at 96; Applic. Exh. K at 26. ISO Standard 9613-2 cautions that this modeling has an uncertainty factor of plus or minus at least three decibels for noise sources 30 meters in height or shorter. UNU Exh. 57 at 14; Hessler, Tr. Vol. III 751-52; James, Tr. Vol. VI 1396. The uncertainty factor for taller noise sources, such as a wind turbine with a tip height of 492 feet (150 meters), is even larger. Hessler, Tr. Vol. III 752; James, Tr. Vol. VI 1396. Mr. James, who pioneered the use of computer modeling of sound by acoustical engineers, warns that ISO 9613-2 was not intended for wind turbines, and its limitations make its use for noise sources taller than 30 meters questionable. James Dir., UNU Exh. 31A, Ans. 51, Ans. 52; James, Tr. Vol. VI 1455-56. The ISO 9613-2 procedure also is not meant for noise sources more than 1000 meters (3280 feet) away. UNU Exh. 57 at 14; James, Tr. Vol. VI 1396.

Mr. Hessler attempted to defend the accuracy of his sound model by arguing that he has recorded sound levels from five of his wind power projects and has found the actual levels to be the same as the model-predicted levels. Hessler, Tr. Vol. III 752-53. However, he qualified this assertion by acknowledging that he believes a model to be accurate even if its predictions are off by as much as five decibels. *Id.* at 761-63. Consistent with this margin of error, he admitted that his noise predictions for the Buckeye Wind project may be off by as much as five decibels. *Id.* at 760-61. Mr. James also testified that the Cadna model may be off by at least five decibels due to the height of the turbines and the published errors in manufacturers' measurements of their turbines' noise levels. James Dir., UNU Exh. 31A, Ans. 54, points 1, 4, and 5; James, Tr. Vol. VI 1397.

Mr. Hessler's assertions about the accuracy of his past modeling are further dispelled by the acoustical engineering profession's cardinal rule that modelers should never field verify their own noise models. *Id.* at 1391. Mr. Hessler's self-validation of his own sound models is afflicted with bias, whether he realizes it or not. *Id.* at 1391-92. Moreover, the model must be validated under the exact conditions evaluated in the sound model, such as the same wind direction, the same turbine power output, and other details, and this is very difficult to do correctly. *Id.* at 1459. This reality is illustrated by one of the wind projects whose noise levels Mr. Hessler evaluated for consistency with his predictive sound model, the Noble Bliss Wind Park in New York. Hessler, Tr. Vol. III 753-54. Although Mr. Hessler testified that his field tests verified his sound model, Mr. James' sound measurements at Noble Bliss inside a neighbor's home exceeded 40 decibels and were far higher than Mr. Hessler's model had predicted. James, Tr. Vol. VI 1461. Mr. James' sound measurements at another wind project,

Mars Hill, revealed a similar disparity between actual noise levels and another consultant's model-predicted levels. *Id.* at 1460.

Injecting even more inaccuracy into the sound model, Mr. Hessler assumed that the soil would always absorb some turbine sound, based on the premise that the ground is always "acoustically soft." *Applic. Exh. K* at 26. Accordingly, he utilized a 0.5 ground absorption coefficient in his model, which decreased the predicted sound level of the turbines by two decibels. *Hessler, Tr. Vol. III* 783-84. While he characterized this coefficient as "conservative" (*Applic. Exh. K* at 26), the coefficient fails to account for the lack of soil absorption when frozen (*James Dir., UNU Exh. 31A, Ans. 54, point 3*). Frozen soil occurs in the winter, precisely when the absence of insects and leaf rustle makes turbine noise more likely to be heard. In addition, the height of the turbines reduces the opportunity for turbine noise to hit and be absorbed by the ground. *Id.* at point 2.

Consequently, even for the Repower MM92 turbine and even without misapplying the ground absorption coefficient, Mr. Hessler's sound model may under-predict noise levels by as much as five dBA. If Buckeye Wind uses the Nordex 100 turbine, this will increase the noise levels by another two to three dBA. The erroneous use of the ground absorption coefficient underestimates the noise levels by yet another two decibels.

Further enlarging his modeling errors, Mr. Hessler failed to model Buckeye Wind's wind turbines as line sources rather than as point sources where the turbines are proposed to be sited in lines. Mr. Shears admitted that two turbines make more noise than one, analogizing them to two cars driving down a road making more noise than one. *Shears, Tr. Vol. I* 157-58. Mr. Hessler admitted that, if any of the turbines is a line source, his model underestimates its predicted noise. *Hessler, Tr. Vol. III* 781. While Mr. Hessler insisted that wind turbines are never line sources,

the acoustical engineering community disagrees with his position. Hessler, Tr. Vol. III 781-83; James, Tr. Vol. VI 1471-73. Two respected acoustical engineers contracting with NASA found that wind turbines in a row do act as line sources. UNU Exh. 60 at 19; Hessler, Tr. Vol. III 782-83; James Dir., UNU Exh. 31A, Ans. 33, Ans. 42; James, Tr. Vol. VI 1471-73; UNU Exh. 49 at 23 (Minn. Dept. of Health).

Seeking to disguise the wind project's actual noise impacts, Buckeye Wind's application places considerable emphasis on the differential between background and turbine noise using Leq values. Applic. at 96-97. However, as Mr. Hessler has admitted, the Leq is meaningless to evaluate the turbines' noise impacts.

Even if Mr. Hessler's model is accurate, Mr. Hessler admitted that "there's no question" that Buckeye Wind's wind project as proposed will exceed the five dBA differential "from time to time." Hessler, Tr. Vol. III 822. When compared to the L90, Buckeye Wind's calculations conclude that the wind turbines' daytime noise levels will exceed the five dBA differential above Buckeye Wind's 35 dBA daytime background figure, i.e., 40 dBA, at "a few residences." Applic. at 98. Nighttime noise levels will exceed the five dBA differential above Buckeye Wind's 29 dBA nighttime background figure, i.e., 34 dBA, at "numerous residences." *Id.* Nighttime turbine noise will be "distinctly audible, at least intermittently, over a fairly wide area." Applic. Exh. K at 27. All of the homes inside the contours for 34 dBA on Plots 2A, 2B, 2C and 2D of Application Exhibit K will be exposed to more than a five dBA increase in noise.

Mr. Hessler estimated that his 34 dBA contour lines are "a little under a thousand meters" from the proposed turbines. Hessler, Tr. Vol. III 855-56. Buckeye Wind admits in its interrogatories that 1004 homes are located within 1000 meters (one kilometer or 0.62 mile) from a proposed Buckeye Wind turbine site as the project is currently configured. UNU Exh. 43

at 5, Int. 12. Consequently, even if all of Mr. Hessler's modeling assumptions were accurate, about 1004 homes will be afflicted with turbine noise of over 34 dBA, exceeding the five dBA differential between turbine noise and background sound.

The situation will be worse during stable atmospheric conditions when the turbines are rotating at full capacity during calm ground conditions. When the L90 readings dip below Mr. Hessler's L90 background of 29, the differential between turbine noise and background sound will be even greater. As shown in figure 2.5.2 of Application Exhibit K, the L90 background sound ranges between about 18 and 29 dBA for substantial periods on most nights. Applic. Exh. K at 12. During those lengthy nighttime periods, even turbine noise of 34 dBA will be as much as 16 dBA above background (34 dBA minus the lowest L90 of 18 dBA). Being far above the five dBA differential, these noise levels will impair the neighbors' ability to sleep.

In addition, due to the errors in Mr. Hessler's background sound study and modeling, his contour lines could under-predict Buckeye Wind's noise impacts by as much as 15 dBA. James Dir., UNU Exh. 31A, Ans. 83. This estimate is the product of adding the following decibels to Mr. Hessler's figures for the following errors:

- 2 dBA for increasing his calculation of the background sound level from 27 dBA to 29 dBA by placing his recording devices in unrepresentative noisy locations;
- 5 dBA for inherent uncertainties in the ISO 9613-2 procedure and the manufacturers' noise tests on their turbines;
- 2 dBA for the erroneous use of the ground absorption coefficient;
- 3.4 dBA for assuming high wind speeds at ground elevation will mask higher wind speeds at hub height even during frequent calm ground conditions (1.4 dBA for daytime); and

- 2-3 dBA if the Nordex N100 turbine is installed.

Total: 14.4 to 15.4 dBA at night; 12.4 to 13.4 dBA in daytime;
(the error will be larger if the turbines are line sources)

In summary, Buckeye Wind's 34 dBA contour lines at night as shown in Application Exhibit K, Plots 2C and 2D, already reveal that many homes will be exposed to noise increases above five dBA. If Mr. Hessler's study is inaccurate, and indeed it is, about 1004 homes will experience noise increases up to 20 dBA above background. Many additional homes outside of the contour lines that Mr. Hessler has inaccurately designated as 34 dBA contour lines on Plots 2C and 2D will also be afflicted by noise increases of substantially more than five dBA. Similar increases will occur during daytime.

Consequently, the UNU Intervenors request that the Board return Buckeye Wind's application and require Buckeye Wind to redo its noise modeling to correct the errors described above. In this process, Buckeye Wind should redraw its contour lines on Plots 2A, 2B, 2C, and 2D to accurately show the predicted noise increases due to its turbines. Once this information is submitted to the Board via an amendment to the application, discovery and the hearing record should be reopened to adjudicate the accuracy of the additional information so that the Board can make an informed decision about the noise impacts of the proposed turbine locations. In advance of this process, the Board's order should inform Buckeye Wind that no turbine may cause more than a five dBA increase in noise so that Buckeye Wind will know what target it must meet in its amended application. If the Board decides not to follow this procedure, the UNU Intervenors request that the certificate contain a condition prohibiting Buckeye Wind's turbines from increasing the noise above the 27 dBA background levels by more than five dBA at any nonparticipant's property line.

d. No Nonparticipating Neighbor Should Be Exposed To More Than 35 dBA Of Noise At Any Time.

Buckeye Wind refers to sound levels of 35 to 45 dBA as faint, quiet, or very quiet, citing two references it did not produce during the hearing. But respected authorities in the acoustical engineering field disagree with Buckeye Wind's self-serving statement.

Eja Pedersen, who Mr. Hessler acknowledged as respected in the field of acoustic engineering, performed a controlled study on the effects of wind turbine noise on the neighbors of wind projects. UNU Exh. 47; Hessler, Tr. Vol. III 850. Another Buckeye Wind witness, Kenneth Mundt, relied on her study as support for his opinions. Mundt Dir., Applicant Exh. 6, Ans. 7. The subjects of Ms. Pedersen's study reported their annoyance at the "swishing, whistling, pulsating/throbbing, and resounding" of the wind turbines. UNU Exh. 47 at 3466.

Ms. Pedersen found that 6% of the persons exposed to turbine noise of 35 dBA were highly annoyed and another 6% were rather annoyed (a total of 12%). *Id.* at 3465, Table V, and at 3468, Fig. 3. These percentages continued to rise with increased turbine noise, with 20% and 8% (a total of 28%) being very annoyed and rather annoyed, respectively, at noise levels of 37.5 to 40 dBA. *Id.* at 3465, Table V, and at 3468, Fig. 3. At noise levels over 40 dBA, 36% were highly annoyed and another 8% rather annoyed (a total of 44%). *Id.* at 3465, Table V, and at 3468, Fig. 3; Hessler, Tr. Vol. III 851.

Ms. Pedersen concluded that wind turbine noise is significantly more annoying than the same noise levels from aircraft, road traffic, and railways, which were not perceived as highly annoying below sound levels of over 50 dBA. UNU Exh. 47 at 3468. In this study and two other Pedersen studies, a combined total of 50% of the persons exposed to noise over 40 dBA reported annoyance (22 of 45 people), and 24% of the persons exposed to noise levels between 35 and 40 dBA reported annoyance (67 of 276 people). UNU Exh. 49 at 17.

David Hessler agreed with Eja Pedersen's conclusions in his opening testimony. Hessler, Tr. Vol. III 851. Then, he abruptly changed his testimony in his rebuttal testimony, attempting to belittle her conclusions by arguing that only a handful of wind project neighbors were found to be annoyed by wind project noise. Hessler, Rebuttal Tr. Vol. I 2349-59. This distinction is contradicted by the number of persons found annoyed in Pedersen's three studies. Mr. Hessler also contended that the number of complaints received by his wind development clients were more accurate representations of the levels at which wind project noise is bothersome, as if second-hand information from biased developers is more accurate than Ms. Pedersen's carefully controlled survey. *Id.* at 2346-47, 2356. His reliance on the developers' representations belies his claim that he believes only what he sees and measures. *Id.* at 2363-64. Mr. Hessler's change in position, which he admitted was inconsistent with his prior testimony (*id.* at 2358), is not credible.

Similar studies conducted in the European Union for existing wind turbine utilities show that the absolute sound level where 10% of the population reports the noise as "annoying" is approximately 10 dBA lower for wind turbines than it is for the other noise sources. James Dir., UNU Exh. 31A, Ans. 35. The most recent study of this type is titled: "WindFarm Perception" sponsored by the University of Groningen and Göteborg University. *Id.* This study involved a review of operating wind utilities where the turbines ranged from small models to the large types proposed for the Buckeye Wind Project. *Id.* It reports that the sound level at which 10% of the population is "very annoyed" is 30 to 35 dBA. *Id.* At these sound levels, sleep disturbance was reported by 25% of the population. *Id.* Many other studies have identified this increased sensitivity to turbine noise over what would be expected from other common noise sources *Id.*

Mr. Hessler admitted that between 5% and 40% of the persons living between the 34 dBA and 40 dBA contour lines in Plots 2C and 2D may be highly annoyed by Buckeye Wind's noise. Hessler, Tr. Vol. III 851-52. He also made the following admission in his direct testimony:

[T]here are a moderate number of homes within the 40 dBA daytime threshold (an L90 of 35 dBA plus 5 dBA) and a large number within the 34 dBA nighttime threshold.

Hessler Dir., Applicant Exh. 8, Ans. 6.

OPSB staff member Raymond Strom stated that, before he heard evidence at the hearing, he had no reason to believe that Buckeye Wind's noise would damage its neighbors' health because he has not experienced adverse health effects from the highway near his home. Strom, Tr. Vol. VIII 1930-32. A review of Eja Pedersen's study shows why road noise may not be damaging Mr. Strom's health, while wind project neighbors are highly annoyed and sleep impaired by wind turbine noise. Due to amplitude modulation and the "swishing, whistling, pulsating/throbbing, and resounding" of wind turbines, a significant number of neighbors (5%) are highly annoyed with wind turbine noise at 34 dBA, while the same degree of annoyance is not reached for road noise until 50 dBA. UNU Exh. 47 at 3469 (text and Fig. 3). Road traffic does not produce 25% in high annoyance until 70 dBA, in contrast to 35% high annoyance at wind turbine noise of 40 dBA. *Id.* at 3468, fig. 3; Hessler, Tr. Vol. III 851.

The most significant health problem caused by wind turbine noise is the loss of sleep. Adequate sleep is essential for general healthy functioning. UNU Exh. 46 at 519 (abstract). Restricting sleep below a person's optimal time in bed can cause a range of neurobehavioral deficits, including lapses of attention, slowed working memory, reduced cognitive throughput, depressed mood, and perseveration of thought. *Id.* Even the continued restriction of sleep to less

than seven hours per night may cause significant daytime cognitive dysfunction. *Id.* at 519 (abstract) and 526. Reduced sleep is associated with cardiovascular morbidity, traffic accidents, and death. *Id.* at 526.

The World Health Organization (WHO) has determined that the exposure to noise can result in health problems. Although the WHO 2009 Night Noise Guidelines for Europe are based on epidemiological and experimental studies (Applicant Exh. 18 at XVI), Buckeye Wind's epidemiologist Kenneth Mundt missed or ignored them in his testimony. WHO found that noise causes sleep disturbance, and sleep disturbance damages a person's health. *Id.* at XI.

The WHO 2009 Night Noise Guidelines list the following effects of sleep disturbance:

The review of available evidence leads to the following conclusions:

- Sleep is a biological necessity and disturbed sleep is associated with a number of adverse impacts on health.
- There is sufficient evidence for biological effects of noise during sleep: increase in heart rate, arousals, sleep stage changes and awakening.
- There is sufficient evidence that night noise exposure causes self-reported sleep disturbance, increase in medicine use, increase in body movements and (environmental) insomnia.
- While noise-induced sleep disturbance is viewed as a health problem in itself (environmental insomnia) it also leads to further consequences for health and well-being.
- There is limited evidence that disturbed sleep causes fatigue, accidents and reduced performance.
- There is limited evidence that noise at night causes hormonal level changes and clinical conditions such as cardiovascular illness, depression and other mental illness. It should be stressed that a plausible biological model is available with sufficient evidence for the elements of the causal chain.

Id. at XII. WHO found that night noise is related to self-reported sleep disturbance, use of pharmaceuticals, self-reported health problems, and insomnia-like symptoms. *Id.* at XI. When WHO finds “sufficient evidence” for these effects, it means that a direct causal relationship between noise and the health effects has been established. *Id.* When WHO finds “limited evidence,” it means that indirect evidence of good quality supports the causal association. *Id.* Indirect evidence is often abundant, linking noise exposure to an intermediate effect of physiological changes which lead to the adverse health effects. *Id.* That is, “limited evidence” refers to the indirect link between noise and health effect, not the amount of evidence linking them. As one example of an indirect link, sleep disturbance causes drowsiness during driving, which in turn causes accidents. *Id.* at XII.

WHO determined that the onset of motility (body movements while sleeping) occurs at 32 decibels (dB) (*id.* at XIII) thereby signaling the start of disturbed sleep. Applicant’s Exh. 18 at XIII. This problem becomes more serious at 35 dB, with EEG awakening and changes in duration of various stages of sleep, in sleep structure, and fragmentation of sleep. *Id.* Complaints also occur at 35 dB. *Id.* at XIV. Dependence on sleep aids and sedatives starts at 40 dB. *Id.* at XIII. The sleep problems become even worse above 40 dBA. *Id.* WHO was unable to identify the sound level at which other health problems start to affect a person, such as changes in cardiovascular activity, changes in stress hormone levels, drowsiness and tiredness, increased daytime irritability, impaired social contacts, impaired cognitive performance, depression, occupational accidents, and premature mortality. *Id.* at XIII-XIV.

WHO concludes that adverse health effects are directly observed at noise levels above 40 dB, so that many people have to adapt their lives to cope with the noise at night. *Id.* at XVII. While WHO stated that there presently is no “sufficient evidence,” (defined at page XI as

evidence of a direct, causal link) that the biological effects observed at noise levels below 40 dB are harmful to health, this does not address the health effects for which there is “limited evidence” (i.e., indirect evidence of a causal relationship). *Id.* at XVI. WHO has not determined that noise between 30 dB and 40 dB has no health effects, but merely that the research in that area is incomplete. James, Tr. Vol. VI 1489-90. The only noise level known to be safe is under 30 dB. *Id.* WHO also observes that children, the chronically ill, and the elderly are more susceptible to body movements, awakening, self-reported sleep disturbance, and arousals caused by noise between 30 dB and 40 dB. Applicant Exh. 18 at XVII.

Although the WHO 2009 guidelines recommend a nighttime noise guideline of 40 dB, they caution that the intensity of noise effects between 30 dB and 40 dB depends on the nature of the source and the number of events. *Id.* Therefore, they express no opinion about the health effects of noise in that range. Moreover, the 2009 WHO guidelines specify that the 1999 WHO noise guidelines still are “valid and relevant for the Member States to achieve the guideline values of this document.” *Id.* at XVIII. The 1999 WHO guidelines, in turn, find that a large proportion of low frequency components in noise may increase considerably the adverse effects on health. UNU Exh. 49 at 20. The 1999 WHO guidelines also recommend 30 dBA as a limit for “a good night’s sleep.” *Id.* at 22.

The 2009 WHO guidelines do not differentiate between wind turbine noise and other noise sources. The amplitude modulation of wind turbines and the quietness of rural communities increase the likelihood of sleep deprivation between 30 dB and 40 dB. James, Tr. Vol. VI 1489. The 2009 WHO study does not address the sleep depriving effects of amplitude modulation that makes sleep more difficult. *Id.* at 1480. In fact, Pedersen’s observations that wind turbine noise causes annoyance at lower thresholds than other types of noise such as cars,

planes, and trains indicates that sleep deprivation from wind turbines occurs at a lower decibel level.

Consequently, the health studies specific to wind turbines are important in determining the appropriate limit for wind turbine noise. These studies support 35 dBA as the threshold at which unacceptable noise impacts begin. Accordingly, the Minnesota Department of Health observed that complaints appear to rise with increasing outside noise levels above 35 dBA. UNU Exh. 49 at 25. Dr. Amanda Harry found that wind turbine noise caused annoyance in populations exposed to sound levels of 37 dBA and severe annoyance at 42 dBA. UNU Exh. 44 at 22. She determined that noise-induced sleep disturbance is the most deleterious effect and leads to adverse health effects. *Id.* at 27.

Eja Pedersen determined that 12% of wind project neighbors are very or rather annoyed at 35 dBA, resulting in sleep disturbance, tiredness, and negative emotions. UNU Exh. 48 at 484. For that reason, she regards annoyance as an adverse health effect. *Id.* at 485. She did not find other health effects, but she only inquired into the existence of chronic disease such as diabetes and cardiovascular disease. *Id.* at 481, 485.

Dr. Mundt testified that consistent sleep deprivation (as opposed to occasional sleeplessness that everyone experiences) leads to health problems. Mundt, Tr. Vol. II 467, 469. These health problems can include neurobehavioral deficits such as lapses of attention, slowed memory, reduced cognitive thought, and depressed mood. *Id.* at 472-73.

To prevent such problems, Germany uses an absolute limit of 35 dBA for wind turbine noise in rural communities. James Dir., Ans. 26; UNU Exh. 32 at 13. Mr. James also testified that sound levels should not be allowed to exceed 35 dBA. James, Tr. Vol. VI 1487. Since the Staff deferred to Germany's experience with wind turbines in following that country's shadow

flicker standard (Staff Exh. 2 at 42), the same rationale warrants that Germany's noise standard also be utilized.

The foregoing literature shows that some authorities regard sleep disturbance or physical or mental discomfort in themselves to be adverse health effect, whether or not disease or other bodily malfunctions result. Other authorities, while acknowledging the misery and impaired life style resulting from sleep disturbance and discomfort, do not regard them as health effects in themselves. Whether or not health problems occur, Buckeye Wind should not be allowed to cause discomfort or annoyance to the neighbors or deprive the community of its sleep. Accordingly, noise limits should be established at a level that will prevent misery and sleep disturbance.

In summary, the evidence discussed in this section supports a finding that turbine noise above 35 dBA causes unacceptable sleep disturbance, annoyance, discomfort, and health problems:

- As explained in Section III. A. 2. a. above, accepted acoustic engineering practices for preventing bothersome noise limit a new source of noise to an increase of five dBA over background. This equates to the level at which 10% of the population will be annoyed by the noise. James Dir., UNU Exh. 31A, Ans. 35. For this Project, a five dBA increase over Mr. James' and Mr. Hessler's background sound calculations is 32 dBA and 34 dBA, respectively. Thus, at 35 dBA, the increase over background reaches unacceptable levels.
- Pedersen's study found that the number of neighbors very annoyed or rather annoyed at a noise level of 35 dBA rose is 12% (6% of this annoyed group are

“very annoyed,” as shown by the figure on page 3468 of the Pedersen report introduced as UNU Exh. 47).

- A study by the University of Groningen and Göteborg University found 10% of the population is “very annoyed,” and 25% suffers sleep disturbance from wind turbine noise between 30 to 35 dBA. James Dir., UNU Exh. 31A, Ans. 35.
- Even for noise sources without amplitude modulation, WHO 2009 finds that disturbed sleep begins at 32 dBA as demonstrated by increased motility. Applicant Exh. 18 at XIII. This problem becomes more serious at 35 dB, with EEG awakening and changes in duration of various stages of sleep, in sleep structure, and fragmentation of sleep. *Id.* Complaints also occur at 35 dB. *Id.* at XIV. Children, the chronically ill, and the elderly are more susceptible to body movements, awakening, self-reported sleep disturbance, and arousals between 30 and 40 dBA. *Id.* at XVII. WHO 1999 recommends 30 dBA for a good night’s sleep. UNU Exh. 49 at 20.
- The Minnesota Department of Health has found that neighbor complaints rise with increasing outside noise levels above 35 dBA. UNU Exh. 44 at 25.
- Germany, with its considerable experience in turbine regulation, has found that a limit of 35 dBA is necessary. James Dir., UNU Exh. 32 at 13. Neighbors in jurisdictions allowing higher wind turbine noise levels have been suffered from excessive noise.
- Without a 35 dBA limit, thousands of people will be exposed to objectionable noise that will ruin their lives and property.

Accordingly, the Board should require the noise levels from Buckeye Wind's turbines to stay below 35 dBA at all times as measured at the property lines of nonparticipating neighbors so they can enjoy their lives and properties.

Buckeye Wind's application and Mr. Hessler's testimony both admit that some neighbors will be exposed to more than 40 dBA of noise from Buckeye Wind's turbines. Hessler, Rebuttal Tr. Vol. I 2383-91. This noise exposure will be as high as 42 dBA (*id.* at 2388), which is seven dBA higher than the 35 dBA threshold for finding sleep disturbance and health problems. That is, these are the noise levels that would occur if Mr. Hessler's model were accurate.

As explained in a prior section of this brief, Mr. Hessler has greatly under-predicted the wind project's noise levels through errors in modeling. For example, the McConnells' home will be exposed to dBA noise levels in the high-30s and low-40s, not less than 34 as Buckeye Wind predicted. James, Tr. Vol. VI 1372. Taking into account Mr. Hessler's modeling errors (but not his two dBA error in calculating background sound), the project's actual noise levels may exceed his predictions by as much as 12.4 to 13.4 dBA at night and 10.4 to 11.4 dBA in daytime.

To ensure that the property of no nonparticipating neighbor is impaired by exposure to more than 35 dBA of turbine noise, the UNU Intervenors request that the Board follow the same remodeling, discovery, and rehearing procedure that the UNU Intervenors recommended above to prevent increases over five dBA above background. In advance of this process, the Board's order should inform Buckeye Wind that turbine noise levels may not be higher than 35 dBA at the property line of any nonparticipating neighbor. If the Board chooses not to follow this recommendation, the UNU Intervenors request that the certificate contain a condition prohibiting Buckeye Wind's turbines from exceeding a noise level of 35 dBA at any nonparticipant's property line.

e. **The Wind Turbines Should Be Located At Least 1.25 Miles From Any Nonparticipating Neighbor.**

Buckeye Wind has proposed to place turbines as close as 590 feet from the property boundaries of non-participating neighbors and 914 feet from residences. Applic. at 47; Shears Dir., Applicant Exh. 4, Ans. 19, p. 15. At this close range, the turbines are guaranteed to impose considerable annoyance, sleep disturbance, and health effects on the community.

Rene Taylor, who lives about 1500 to 1800 feet from wind turbines in Illinois, testified that she and her family have experienced difficulty sleeping, headaches, irritability, ear pressure, and fatigue. Taylor Dir., UNU Exh. 65 at 3. Some of her family members have heart palpitations. *Id.* Her youngest daughter has stated that the palpitations feel like a hamster running across her chest. *Id.* Her autistic son is the most sensitive to the noise, becoming fitful and throwing tantrums until he is able to leave the homestead. *Id.* at 4.

Dr. Michael Nissenbaum has found that 14 of 15 neighbors living within 1200 to 3400 feet of the Mars Hill wind project have experienced health effects such as sleep disturbance, headaches, dizziness, and weight changes. Mundt, Tr. Vol. II 530-34; UNU Exh. 51. While Buckeye Wind's epidemiologist, Dr. Mundt, stated that he was unaware of a control group for Dr. Nissenbaum's study, Mr. James has seen the preliminary documentation of Dr. Nissenbaum's control group study and Dr. Mundt acknowledged the control study had been performed.⁶ James, Tr. Vol. VI 1447; Mundt, Tr. Vol. II 535.

Dr. Amanda Harry found adverse health symptoms up to a mile from wind turbines, including sleep disturbance, headaches, palpitations, stress, anxiety, depression, vertigo, and tinnitus. UNU Exh. 44 at 21, 30; Mundt Dir., Applicant Exh. 6 at 10.

⁶ More information about Dr. Nissenbaum's study and control group would have produced had the ALJs allowed him to testify by deposition as the UNU Intervenors requested. The denial of this request was erroneous and should be reversed.

Richard James' research has documented that neighbors within 1.25 miles of wind turbines are awakened frequently, suffer sleep deprivation, and hear the wind turbines as the dominant noise when outside their homes. James Dir., UNU Exh. 31A, Ans. 49. The noise is audible inside their homes during the winter with windows closed, especially in bedrooms where the sounds interfere with sleep. *Id.* Mr. James has personally stayed overnight in a home about 700 meters (2296 feet) from wind turbines, and discovered that his sleep was disturbed even after he used a prescription sleep aid. *Id.* at Ans. 40.

To avoid these effects, France has established setbacks of more than a mile from wind turbines. Hessler, Rebuttal Tr. Vol. I 2320. Dr. Harry has recommended a setback of 1.5 miles until further medical and epidemiological research is completed to fully evaluate the extent of the health effects. UNU Exh. 44 at 30.

Similarly, Richard James has found that any wind turbine project with randomly located wind turbines (known as point sources) should be located at least 1.25 miles from the nearest residential property line. James Dir., UNU Exh. 31A, Answers 29, 31, 32, 33, 36, 37, 40, 49. According to a study performed for NASA, noise from point source turbines decays at a rate of 3 decibels. *Id.* at Ans. 33; UNU Exh. 60. At this decay rate, noise from point source turbines does not attenuate to acceptable levels until it travels 1.25 miles. James Dir., UNU Exh. 31A, Ans. 33. That is, turbine noise levels will decay to about 35 dBA, or one decibel above Mr. Hessler's background level of 29 dBA, at 1.25 miles from the turbines. *Id.* at Ans. 44. Mr. James' personal experiences also support the accuracy of this figure, including modeling and observations about the travel distances for noise from other wind projects. *Id.* at Ans. 32; James, Tr. Vol. VI 1373-74.

Because noise from turbines arranged in rows (known as line sources) decays or is reduced with increasing distance at half the rate of the randomly located turbines, they should be located at least two miles from the nearest residential property. James Dir., UNU Exh. 31A, Answers 30, 33, 41, 42. Studies of wind turbines conducted for NASA in the 1980s and early 1990s confirmed that wind turbines in rows or arrays must be modeled as line sources. James Dir., UNU Exh. 31A, Ans. 30; UNU Exh. 60. Failure to do so results in serious under-prediction of the sound levels at receiving properties. James Dir., UNU Exh. 31A, Ans. 30. Even for short distances of 1000 feet to several thousand feet, errors caused by modeling rows of wind turbines as point sources instead of line sources results in under-predictions of 5 to 7 dB. *Id.* At greater distances this error becomes even larger. *Id.*

Buckeye Wind's project as proposed does not provide for setbacks of at least 1.25 or 2.0 miles from point source turbines and line source turbines, respectively, from either the homes or property lines of non-participating neighbors. *Id.* at Ans. 43, Ans. 44, Ans. 46, Ans., 47. The McConnells' home is about 1,750 feet (one third mile) from the closest turbine and their property line is about 798 feet (0.15 mile) away. McKew Dir., UNU Exh. 19A at 14; Johnson Dir., UNU Exh. 1A at 11. Julia Johnson's home is 2500 feet (less than a half mile) from a point source turbine. James Dir., UNU Exh. 31A, Ans. 45. Her property line is only 648 feet from a proposed turbine site. McKew Dir., UNU Exh. 19A at 14. Turbines are also located between a quarter mile and a half mile from the properties of UNU members Linda and Larry Gordon (1662 feet), Glenda Rodriguez (2517 feet), James and Anita Bartlett (2656 feet), and Larry and Irene Peace (1276 feet). *Id.* at 13-14.

In summary, a minimum of 1.25 miles (for point sources) or 2.0 miles (for line sources) from nonparticipating neighbors' property lines is necessary to keep turbine noise at these

locations under 35 dBA and to avoid a noise increase above five dBA. Therefore, the UNU Intervenor request that the Board's certificate prohibit the construction of any turbine closer than 1.25 miles (for point sources) or 2.0 miles (for line sources) from nonparticipating neighbors' property lines. If the Board follows this recommendation, it will not be necessary to reopen the application or the hearing record to obtain an accurate noise model.

f. The Board Should Not Allow The Wind Project's Low Frequency Noise To Exceed 60 dBC As An Absolute Limit Nor To Exceed 20 Decibels Above The LA90 Pre-Construction Background Sound Level Plus Five Decibels.

The foregoing discussion has been limited to the impacts of high frequency noise from Buckeye Wind's wind project. The high frequency noise from Buckeye Wind's wind project as proposed will harm the community whether or not the turbines produce significant quantities of low frequency noise. Therefore, either way, the standards for high frequency noise should limit the noise increase to five dBA above background, setbacks of 1.25/2.0 miles from point source/line source turbines, and a ceiling of 35 dBA. However, A-weighted noise with a large low frequency component is not a reliable assessment of loudness. UNU Exh. 49 at 11 (Minnesota Dept. of Health, citing the 1999 WHO report). Consequently, low frequency noise from wind turbines also warrants the Board's attention and merits an additional limit separately applicable to low frequency noise. Otherwise, the intrusiveness of low frequency wind turbine noise from an improperly sited wind project will impair the community's health and welfare.

Buckeye Wind contends that wind turbines do not generate "excessive" amounts of low frequency noise, citing studies by Sondergaard and George Hessler. Applic. at 99-100; Applic. Exh. K at 29-30. However, Application Exhibit K reports the sound levels from these studies as A-weighted decibels. Applic. Exh. K at 29-30. That is, these figures are formatted so that they

do not reveal the turbines' C-weighted noise. This is an obvious attempt to bias the thinking of the reviewer.

While Buckeye Wind's application states that low frequency noise is no longer a problem due to the upwind blades now used in the industry (Applic. at 99), Mr. Hessler testified that he knows of only one old wind project in California that has used downwind blades (Hessler, Tr. Vol. III 805). Nevertheless, wind turbines with upwind blades are still causing problems with low frequency noise. Mr. James' recordings of sound at wind projects using upwind blades have revealed considerable low frequency noise. James Dir., UNU Exh. 31A, Ans. 62. The turbine test data of wind manufacturers are consistent with Mr. James' measurements. *Id.* at Ans. 62, Ans. 63.

Low frequency sound travels further with less attenuation over distance than mid and higher frequency sounds and penetrates walls of homes with less reduction in level. *Id.* at Ans. 64. The Minnesota Department of Health has found that low frequency sounds are not effectively attenuated by walls and windows of most homes. UNU Exh. 49 at 9. For example, the distant rumble of thunder readily penetrates a home's walls, even though its high frequency component (the "cracking" sound) cannot be heard from that distance. James Dir., UNU Exh. 31A, Ans. 64; James, Tr. Vol. VI 1374-76. A similar effect is noticed when amplified lowest frequencies of music from a "boom car" make nearby vehicles shake. James Dir., UNU Exh. 31A, Ans. 64.

Low frequency noise also is not masked by the sound of wind in leaves or against ground level structures. *Id.* at Ans. 65. For that reason, wind turbines can be heard as distinct sounds even during high winds and storms. *Id.* This means the noise will be more likely to be both heard and annoying and will be more of a problem inside a home than outside. *Id.* at Ans. 66. In

addition, the great height of Buckeye Wind's turbines will minimize the ground's absorption of the low frequency noise, thus allowing most of it to penetrate neighboring homes unimpeded.

Measurements of low frequency noise by Mr. Hessler's father, George Hessler, have revealed that the low frequency noise inside a home can be almost as loud as outside the home's walls. UNU Exh. 69 at 183. Both David Hessler and Mr. James testified that the levels of low frequency noise entering a neighbor's home from an outside source can even grow louder inside the home due to resonance. Hessler, Tr. Vol. III 805-806; James, Tr. Vol. VI 1376. *See also*, the same conclusion by the Minnesota Department of Health in UNU Exh. 49 at 9.

Buckeye Wind has attempted to deflect attention from the problems caused by wind turbines' high frequency noise by focusing instead on discussions that turbines do not produce significant amounts of low frequency noise. However, while Mr. James' testimony recommended limits for high frequency noise, David Hessler's admissions about the level of low frequency noise expected from the Project demonstrate the need for a limit on low frequency noise.

For example, David Hessler admitted that Buckeye Wind's wind turbines may cause low frequency noise levels to reach as high as 60 decibels at the nearest homes. Hessler, Rebuttal Tr. Vol. I 2323; Hessler Rebuttal Dir., Ans. 5. While David Hessler stated that ANSI Standard B133.9 for gas turbines finds the threshold for the onset of perceptible vibrations occurs between 75 and 80 dBC, his father George Hessler has characterized this dBC level to be "woefully inadequate" as a regulatory limit. UNU Exh. 69 at 180. Although David Hessler has opined that a dBC level under 70 dBC is completely imperceptible (Hessler Rebuttal Dir., Ans. 5), George Hessler's study found that 70 dBC is not appropriate for quiet rural areas, but only for intermittent daytime or seasonal sources in normal suburban or urban residential areas with an

L90 background level over 40 dBA. UNU Exh. 69 at 180, Table 1, Column 1. Thus, according to David Hessler's father, 70 dBC is intrusive in quiet neighborhoods, not imperceptible.

George Hessler has found that a new source of noise with a C-weighted level of 60 decibels "can sound quite loud and threatening to residents accustomed to very quiet surroundings." UNU Exh. 69 at 183. The senior Hessler defined very quiet areas as those with an L90 under 40 dBA (UNU Exh. 69 at 180, Table 1), in contrast to the 27 (or even 29) dBA level of the Buckeye Wind project area. David Hessler acknowledged that some persons are acutely sensitive to low frequency noise that other persons cannot even hear. Hessler, Rebuttal Tr. Vol. I 2336. The Minnesota Department of Health has found that some persons have "extraordinary sensitivity at low frequencies, up to 25 dB more sensitive than the presumed thresholds at some low frequencies." UNU Exh. 49 at 10. While George Hessler recommended an absolute limit of 60 dBC for constantly operating noise sources in very quiet communities, he also urged that the 60 dBC limit be reduced "to not exceed 20 decibels above the A-weighted level" to avoid an unbalanced noise spectrum containing objectionable proportions of C-weighted noise. UNU Exh. 69 at 180.

David Hessler attempted to distinguish George Hessler's conclusions by arguing that they applied to combustion engines, not wind turbines. However, he admitted that ANSI Standard B133.8, upon which he based his opinions about low frequency noise and on which George Hessler based his paper, apply equally to wind turbines. Hessler Rebuttal Dir., Ans. 5; UNU Exh. 69 at 180. Moreover, the abstract for George Hessler's paper states that this limit "should be applicable to most industrial sources of steady low-frequency noise in addition to combustion turbines." *Id.* at 179. George Hessler also noted:

It is believed that the proposed limits would also be valid for other steady and tonal sources of low-frequency noise, such as compressor stations, *wind turbines*, diesel generators, and others.

Id. at 180 (emphasis added).

David Hessler also argued that the low frequency noise in the background sound in some communities would exceed the 20 decibel differential even when the turbines are not operating. Hessler, Rebuttal Tr. Vol. I 2332-34. However, the Kamperman/James treatise recommends a modification of George Hessler's formula to overcome that objection. This paper recommends that "the dBC operating immission limit (as L_{Ceq}) at the receiving property line should not be more than 20 dB above the measured dBA (as LA₉₀) pre-construction long-term background sound level + 5 dB." UNU Exh. 32 at 15 (emphasis added). This formula eliminates the effects of background low frequency noise and limits only the turbines' noise. If, as Buckeye Wind claims, wind turbines do not produce significant low frequency noise, then this standard will be easy to meet. James, Tr. Vol. VI 1421.

The need for such a C-weighted limit has been eloquently expressed by George Hessler as follows:

It is frustrating to continually witness great community distress and ill will towards a plant owner that could have been avoided. Hopefully, greater awareness of the problem and standardized limits for low-frequency noise immissions will minimize such problems.

UNU Exh. 69 at 185. David Hessler agreed that this is a wise principle applicable to any type of noise source. Hessler, Rebuttal Tr. Vol. I 2337-38. The Board should include this limit, as expressed in the Kamperman/James paper, in its certificate for the Buckeye Wind Project. As expressed in George Hessler's paper, the Board should also include an absolute limit of 60 dBC to control low frequency noise.

g. **The Wind Project Must Comply With The Noise Standards At The Property Lines Of Nonparticipating Neighbors, Not Just At The Residences.**

Buckeye Wind prefers to measure the noise increase at neighboring residences, rather than property boundaries. *Applic.* at 25, 93. However, the Board ruled in its rulemaking for wind turbines that “[i]t is imperative that the noise level be evaluated at the boundary of the project site.” *In re Adoption of Chapter 4906-17 to Implement Certification Requirements for Electric Generating Wind Facilities*, Case No. 08-1024-EL-ORD, ¶¶ 120-21 (Oct. 28, 2008).

Buckeye Wind prefers to use an absolute limit of 50 dBA at property lines. *Applic.* at 93. As explained above, this would destroy the neighbors’ ability to use, enjoy, and develop their yards, fields, and undeveloped acreage. However, Buckeye Wind’s project as proposed will exceed even this high noise level of 50 dBA at property lines. Mr. Hessler’s report reveals that turbine sound levels may exceed 50 dBA on neighboring properties. *Applic. Exh. K* at 28. Although Buckeye Wind represents that this will occur in only a “few places,” it does not identify the number or location of the properties on which this is predicted to occur. Consequently, even at this absurdly high limit, the Project would be unapprovable in its present form.

Notwithstanding Buckeye Wind’s failure to comply even with 50 dBA at the property lines, tolerating a noise level of 50 dBA on nonparticipating properties will deprive these non-consenting landowners of their ability to use and enjoy their properties. This noise will intrude on the neighbors’ attempts to use their yards, fields, and undeveloped acreage for outdoor social events and other activities. Julia Johnson, the McConnells, and other UNU members will be unable to comfortably engage in the numerous activities they currently enjoy on their land. They will be unable to build new homes on land affected by the noise for themselves, their children, or anyone else. This land will be unmarketable if they wish to sell it. Consequently, the Board

should limit the wind project's noise at the property lines of nonparticipating neighbors to an increase of five dBA above background, setbacks of 1.25/2.0 miles from point source/line source turbines, a ceiling of 35 dBA, and a differential of no more than 20 decibels between the A- and C-weighted sound emissions of the project.

h. Biased Observations About Turbine Noise By Wind Turbine Proponents Do Not Justify The Siting Of Wind Turbines Uncomfortably Close To Objecting Neighbors.

The driver of a car with a loudly played “boom box” radio may not be bothered by its noise, even when it annoys the occupants of nearby vehicles. Similarly, a participating landowner or other beneficiary of wind projects may not be annoyed by noise that would be expected to bother others. Consequently, it is not surprising that Buckeye Wind's witnesses do not find turbine noise objectionable. *See* the testimony of Leon Cyr (Rebuttal Tr. Vol. II 2466, 2480-81: receives lease payments and royalties for three turbines); Judson Barce (Rebuttal Tr. Vol. II 2434-36: represents government agencies that derive funding from wind projects); Don Bauer (Direct Testimony of Don (“Bauer Dir.”), Applicant Exh. 11, Ans. 4: has contracted for a turbine on his land). The low rate of noise complaints in Benton County, Indiana can be explained not only by low population density, but also by the fact that 90% of the landowners in the wind project areas participate in the wind projects. Barce, Rebuttal Tr. Vol. II 2449-50.

Whereas other drivers can drive away from a noisy “boom” car, the nearby neighbors of a wind turbine have no reasonable escape. Existing wind projects have produced ample evidence that poor siting decisions have caused serious damage to their communities. As documented in the studies of Pedersen, Harry, Nissenbaum, James, and others, wind turbine noise ruins the comfort and health of the persons who have the misfortune of living too close to them.

Larry Wunsch, who lives near a wind project in Wisconsin, introduced a DVD documenting the noise from a turbine about 1100 feet from his home. Direct Testimony of Larry Wunsch (“Wunsch Dir.”), UNU Exh. 30A; UNU Exh. 30. This recording demonstrates that wind turbines are anything but quiet.

Rene Taylor, who lives about 1500 to 1800 feet from wind turbines in Illinois, has attested to the thumping, swishing, whining, and roaring noises produced by the turbines. Direct Testimony of Rene Taylor (“Taylor Dir.”), UNU Exh. 65 at 3. At times, the turbine noise sounds like whistling fireworks. Testimony of Rene Taylor (“Taylor”), Tr. Vol. V 1093. At other times it sounds like a roaring train immediately behind the back door of her home. *Id.* at 1092-93. These conditions have often forced Ms. Taylor and her family to flee indoors due to the unbearable noise in their yard, but even there the turbine noise penetrating the walls of their home makes them miserable. Taylor Dir., UNU Exh. 65 at 2-4.

Robert and Diane McConnell, Julia Johnson, and other UNU members have homes and/or land at similar distances from Buckeye Wind’s proposed turbines. They will be exposed to the same conditions unless the Board adopts setbacks that keep the turbines a reasonable distance away. The UNU Intervenors urge the Board to do so.

i. **Buckeye Wind’s Irresponsible Siting Of Numerous Wind Turbines Unacceptably Close To Nonparticipating Neighbors Does Not Justify The Issuance Of A Certificate That Fails To Protect The Neighbors’ Comfort, Property, And Health.**

Buckeye Wind makes a big deal of its multiple redesigns of the wind project in an attempt to find wind turbine locations that will not pose unacceptable noise impacts on the neighborhood. Buckeye Wind’s application represents that Buckeye Wind sought to reduce adverse noise impacts by moving some turbines or removing them from the project. Applic. at 25; Applic. Exh. K at 32.

However, while Buckeye Wind apparently seeks to be commended for these efforts, its overall approach is hardly praiseworthy. The necessity for these efforts arises out of Buckeye Wind's poor siting decisions. The crux of the problem is that Buckeye Wind is attempting to shoehorn a large wind project into the midst of a crowded community. Buckeye Wind's turbines will encircle entire subdivisions and clusters of homes, and many of them will experience noise increases more than five dBA above background as well as noise levels above 35 dBA. Applic. Exh. K, Plots 2C and 2C; Bauer, Tr. Vol. IV 1056-57; Strom, Tr. Vol. VIII 1898-99.

Furthermore, Buckeye Wind seeks to site its wind project in a county with a growing population density of 93.4 persons per square mile (Applic. Exh. R at 4), in contrast to Benton County with a population density of 23 residents per square mile (Cyr Rebuttal Tr. Vol. II 2482). Buckeye Wind admits that 1004 homes are located within 1000 meters (one kilometer or 0.62 mile) from a proposed Buckeye Wind turbine site as the wind project design is currently configured. UNU Exh. 43 at 5, Int. 12. Mr. Hessler estimated that his 34 dBA contour lines are "a little under a thousand meters" from the proposed turbines. Hessler, Tr. Vol. III 855-56. Assuming an average of four persons live in each home, about 4016 people will be exposed to more than 34 dBA of turbine noise.

The Board must not allow Buckeye Wind to build any turbine that is forecasted to increase noise levels by more than five dBA or that will impose more than 35 dBA on neighboring properties. As Mr. Strom testified, it is important that the Board act to protect health even if only one person is affected. Strom, Tr. Vol. VIII 1927. Surely, the Board should safeguard the health and welfare of the 4016 or more persons who will be affected by this project.

Even if turbines are removed from the project to protect the public's health, safety, and welfare, Buckeye Wind has the means to keep the project viable by substituting other properties as turbine locations. In fact, Mr. Hessler revealed that Buckeye Wind has already done this to a limited degree by adding new turbine sites while Mr. Hessler was looking for ways to reduce noise impacts. Hessler, Rebuttal Tr. Vol. I 2320. Moreover, Buckeye Wind has secured "additional lease positions" and "additional land positions" in the area on which it has not yet proposed wind turbines. Shears, Tr. Vol. I 106, 182.

Moreover, Buckeye Wind is not contractually obligated to use its currently proposed turbine sites, since Buckeye Wind has only entered into pre-leases with participating landowners. Bauer, Tr. Vol. IV 1015. Consequently, Buckeye Wind could add turbines on land not yet part of the project as a substitute for poorly sited turbines currently in the project. Buckeye Wind still has the opportunity to change its turbine locations to accommodate noise and health concerns.

If Buckeye Wind contends that the imposition of the necessary conditions for protecting health, safety, and welfare will prevent its construction of the project as currently proposed, that result would be its own fault for failing to propose alternative turbine sites in its application. As the Board has observed in a review of its rules, "any applicant for an electric power generating facility that proposes only one site runs the risk that the Board may conclude that the only site being proposed is unsuitable and have no choice but to deny the applicant a certificate." *In re Review of Chapters 4906-1 et al.*, Case No. 03-199-GE-BRO, ¶ 11 (July 7, 2003).

No one, not even Buckeye Wind's supporters, recommends that the Board sacrifice the public's welfare in deference to Buckeye Wind's economic arguments. Hess, Tr. Vol. V 1248-49 (project must be carefully sited to prevent harm to residents); Hessler, Rebuttal Tr. I 2317 (in testifying that the project cannot be sited with a 1.25 mile setback, he did not mean to suggest

that the project should be sited regardless of its health and annoyance effects); Arnold, Tr. Vol. IV 1008 (it is in everyone's interest to site turbines in such a way that no one is harmed). The Board should make sure its order protects the comfort, properties, and health of the many residents in the project area. To do otherwise will expose thousands of the State's citizens to noise levels destructive of their health, comfort, and properties, expose Buckeye Wind to damages, and subject the State of Ohio to liability for issuing a certificate that takes property without compensation.

3. The Board Should Not Approve The Siting Of Wind Turbines That Will Cast Excessive Shadow Flicker On Neighboring Land And Residences.

If constructed, every wind turbine within the Project will create shadow flicker during mornings and evenings at certain times of year. Although shadow flicker from turbines more than 0.6 miles away may be "low intensity" (Staff Exh. 2 at 42), flicker from turbines closer than 0.6 miles can cause major annoyance to neighboring properties. The pulsing effect of shadow flicker is dramatically illustrated in the video prepared by Mr. Larry Wunsch. UNU Exh. 30. Such effects would be extremely distracting and annoying to affected neighbors and will diminish the value and development potential of properties within 0.6 miles of the Buckeye Wind Project.

There are no Ohio or federal standards governing the maximum permissible duration of shadow flicker. Applic. Exh. L at 3. Buckeye Wind proposed a proposed standard of 30 hours/year as "the threshold of significant impact, or the point at which shadow flicker is commonly perceived as an annoyance." *Id.* The 30-hour standard is based on unspecified "international studies/guidelines from Germany and Australia."

The Staff recommended adoption of the 30-hour/year standard for shadow flicker. Staff Exh. 2 at 42. The Staff's recommendation was based on the same citations to unspecified

German and Australian standards, as well as standards in four U.S. states. The Staff overlooked the requirements of countries such as Denmark that impose more stringent limits on shadow flicker. Testimony of Nick Doss (“Doss”), Tr. Vol. IX 2212. Furthermore, despite the fact that this is the first case in which the Staff has addressed shadow flicker from wind turbines, the Staff accepted Buckeye Wind’s shadow flicker modeling without verifying its claims or methodology through independent means. *Id.* at 2079-2080. The Board should limit shadow flicker to 10 hours per year, just as Denmark generally recommends for its projects. UNU Exh. 45 at 111.

Even when applying the lenient 30 hr/year standard for shadow flicker, five of Buckeye Wind’s proposed turbines will cause shadow flicker effects in excess of that limit at a total of seven neighboring residences. As is the case with the Applicant’s “design goal” for noise, a shadow flicker standard that is not applied uniformly to all nonparticipating properties is no standard at all. The Board should establish a shadow flicker standard that is uniformly applied to screen out inappropriate locations for turbines. Because shadow flicker affects a neighbor’s entire property, not just the residence, modeling for compliance with the shadow flicker standard should evaluate the duration of flicker over the entire property.

If shadow flicker from a particular turbine is modeled to exceed the selected standard at a nearby residence, that turbine should not be built. In this respect, the Staff correctly recommended that Turbine 70 not be built due to the fact that it “contributes to shadow flicker at residences that exceeds the Staff’s recommended maximum annual flicker exposure level.” Staff Exh. 2 at 65, Cond. 45. However, in other cases the Staff simply recommends that “approved turbines are subject to mitigation after construction up to and including removal, if they exceed 30 hours per year of shadow flicker. . . .” *Id.* 63, Cond. 31. Given that the Application states that Turbines 21, 18, 41, and 16 have been also determined to cause excessive shadow flicker

effects, Staff Exh. 2 at 44, none of those turbine locations should be approved. To permit the construction of those turbines would be to invite inevitable public nuisance and resulting enforcement issues that will be more difficult to resolve once each multi-million dollar turbine is in place. If the Board authorizes these turbines, it should include a condition prohibiting their blades from rotating during times when shadow flicker would otherwise result.

4. **The Buckeye Wind Project As Proposed Will Unreasonably Damage Wildlife.**
 - a. **The Board Should Implement Its Duty To Protect Ohio's Wildlife By Including Reasonable Conditions In The Certificate To Prevent The Applicant From Killing Indiana Bats And Destroying Their Habitat.**

Bats are essential to agriculture and the ecosystem. They consume insects that otherwise would consume the farmers' crops or cause discomfort to people, and they pollinate plants.

Testimony of Cara Meinke ("Meinke"), Tr. Vol. III 613-14, 683. The endangered Indiana Bat eats beetles, flies, mosquitoes, gnats, midges, and "no-see-ums." Meinke, Tr. Vol. III 614; UNU Exh. 53 at 49.

Unfortunately, bats die by flying into wind turbines, or as the rotating turbine blades hit them. Testimony of Keith Lott ("Lott"), Tr. Vol. IX 2259; Meinke, Tr. Vol. III 614. For some unknown reason, bats are attracted to moving wind turbines, increasing their chances of flying into the turbines. Lott, Tr. Vol. IX 2260. Bats that venture close to rotating turbines also die from barotrauma when their lungs decompress and collapse in the air pressure from the blades. Meinke, Tr. Vol. III 615.

A consultant for Invenergy, another wind developer, has found Indiana Bats closer than five miles from Buckeye Wind's proposed turbine sites, including at least one maternity colony and at least one roost. Lott, Tr. Vol. IX 2261; Meinke, Tr. Vol. III 653, 663. The transcript for the Board's confidential hearing session contains more details about these locations.

Buckeye Wind has started discussions with the U.S. Fish and Wildlife Service and ODNR about developing a habitat conservation plan, which is the first step towards obtaining a “take” permit from the Service allowing Buckeye Wind to kill or otherwise harm Indiana Bats in the project area. Meinke, Tr. Vol. III 704-706; Lott, Tr. Vol. IX 2253-64. At this time, ODNR has not identified any specific conditions it will recommend for inclusion in the federal habitat conservation plan. Lott, Tr. Vol. IX 2264. Furthermore, ODNR will not decide what protections are included in the plan, because the federal government controls that decision. Lott, Tr. Vol. IX 2283.

Nevertheless, wildlife such as the Indiana Bat is owned by the State of Ohio in trust for its citizens. Lott, Tr. Vol. IX 2284. Consequently, the State has an obligation under the public trust doctrine as well as under R.C. 4906.10 to add its own conditions to the Buckeye Wind certificate to protect the Indiana Bat and other wildlife. Whether or not the U.S. Fish and Wildlife Service issues or approves a habitat conservation plan, OPSB must not abdicate its authority and responsibility to protect the state’s wildlife resources. If OPSB’s certificate does not contain adequate conditions for protecting the Indiana Bat, the State will lose this important opportunity and shirk its duty to determine what provisions are necessary for this purpose.

UNU requests that the Board include conditions in the certificate to protect the Indiana Bats in the Buckeye Wind project area. These conditions and their rationales are described below.

First, the Board should add a condition to prevent Buckeye Wind from destroying the Indiana Bats’ habitat in the Buckeye Wind project area. The U.S. Fish and Wildlife Service has found that habitat loss is a significant threat to the Indiana Bat. UNU Exh. 53 at 74. Destroying

a bat's habitat during wind farm construction may reduce bat populations. Lott, Tr. Vol. IX 2260.

While Indiana Bats overwinter in caves (known as hibernacula), they reside in trees for the rest of the year. Meinke, Tr. Vol. III 618. Usually, they rest under loose tree bark. *Id.* Roosts are typically located within canopy gaps and along edges of forested habitats, but maternity colonies and other roosts also occur in small clumps of trees or isolated trees. Direct Testimony of Cara Meinke ("Meinke Dir."), Applicant Exh. 7 Ans. 13; Meinke, Tr. Vol. III 619-22. A significant number of Indiana Bat maternity colonies have been discovered in agricultural areas with fragmented forests (Meinke, Tr. Vol. III 622; UNU Exh. 53 at 67-68), a description that applies to the Buckeye Wind project area. Within the project area, 16.3 square kilometers of Indiana Bat habitat have been identified. Meinke, Tr. Vol. III 642.

Buckeye Wind plans to clear 4.1 acres of trees to construct the wind farm. Lott, Tr. Vol. IX 2279-80. If Buckeye Wind cuts down trees that are suitable for Indiana Bat roosting or nesting, this will exacerbate the habitat loss that is endangering this valuable species, particularly in this area where forest tracts are already fragmented. Therefore, the Board should prohibit Buckeye Wind from cutting or clearing any suitable Indiana Bat habitat or any other trees that provide suitable habitat for Indiana Bats.

Second, if Buckeye Wind cuts trees while Indiana Bats are roosting in them, the bats may be killed or harmed. Lott, Tr. Vol. IX 2282. Consequently, it is important to protect trees suitable for Indiana Bat habitat during the season in which the bats are likely to use them. Lott, Tr. Vol. IX 2281-82. Indiana Bats arrive at their summer habitat as early as late March. UNU Exh. 53 at 44-45, 49. Most Indiana Bats enter hibernation by the end of November. *Id.* at 42. The bats stay active during the fall, when the bats fly in and out of the caves in which they intend

to hibernate through the winter. *Id.* at 40-42. Consequently, no tree clearing should occur between April 1 and November 30 in areas in which Indiana Bats may reside. *See also, Animal Welfare Institute v. Beech Ridge Energy LLC*, ___ F. Supp.2d ___, 2009 WL 4884520 (D. Md. 2009) (finding that Indiana Bats travel more than five miles from hibernacula and prohibiting wind turbine operation within ten miles of hibernacula between April 1 and November 15 until the wind turbine company obtains a taking permit for Indiana Bats). The Board should prohibit Buckeye Wind from cutting any trees between April 1 and November 30.

Third, five-mile setbacks should be imposed to prevent Indiana Bats from flying into wind turbines or dying of barotrauma. OPSB staff has identified setbacks between turbines and Indiana Bat habitat as an effective method for protecting the bats. Lott, Tr. Vol. IX 2265. The U.S. Fish and Wildlife Service has determined that wind turbines must be located at least five miles away from Indiana Bat capture and roost locations. Meinke Dir., Applicant Exh. 7 Ans. 9; Meinke, Tr. Vol. III 648-49; Applic. Exh. P (letter of Apr. 9, 2009).

Five miles is the appropriate distance for a setback, because that is the Indiana Bat's travel range from summer roost sites for foraging. The U.S. Fish and Wildlife Service's Indiana Bat Recovery Plan, which is an important reference for Indiana Bats used by Buckeye Wind in its application, finds that Indiana Bats have a travel range of five miles across open fields and highways to forage for food. Meinke, Tr. Vol. III 625-27; UNU Exh. 53 at 50, 66, 69. Buckeye Wind's consultant has verified that Indiana Bats in or near the Buckeye Wind project area in Logan County flew across open areas while being tracked from their capture zones. Meinke, Tr. Vol. III 647.

At the time Buckeye Wind submitted its application, Buckeye Wind represented that its proposed wind farm complied with the five-mile setback. Applic. at 165; Meinke Dir., Applicant

Exh. 7 Ans. 9. However, since that time, Invenergy's consultant has discovered Indiana Bats in Buckeye Wind's project area closer to Buckeye Wind's proposed turbine sites than even Buckeye Wind's consultant would recommend. Meinke, Tr. Vol. III 664. Buckeye Wind should be held to a five-mile standard through a certificate condition requiring all turbines to be at least five miles away from Indiana Bat capture and roost locations. If an Indiana Bat roost is found within five miles of a turbine subsequent to construction, the turbine should be turned off during the time the roost is utilized (i.e., during warm weather months when the bats are not hibernating in caves).

Besides establishing setbacks between turbines and capture and roost locations, the Board should also require a 10-mile setback from hibernacula. According to the U.S. Fish and Wildlife Service's Indiana Bat recovery plan, Indiana Bats arrive at their hibernacula as early as July and may remain active at these sites through mid-October or later. UNU Exh. 53 at 40. Upon arrival, the bats "swarm," a behavior in which large numbers of bats fly in and out of cave entrances from dusk to dawn. *Id.* During this period, the bats mate and forage to build up fat reserves to survive the winter hibernation. *Id.* at 40-42. During this foraging, the bats travel more than five miles to find food, and have been documented at distances of 9 and 19 miles from the cave. *Id.* at 41. This information led the court in the *Beech Ridge Energy* lawsuit to conclude that Indiana Bats may be found and harmed by wind turbines more than five miles from hibernacula. 2009 WL 4884520 at *24. Since swarming bats have been found at distances of 9 and 19 miles from hibernacula, the UNU Intervenors request a setback of 10 miles from Indiana Bat hibernacula as a reasonable measure to protect swarming Indiana Bats.

Fourth, Buckeye Wind should be required to feather its turbine blades during low wind so that Indiana Bats will not be struck by the blades during calmer conditions in which they are

more likely to fly. OPSB staff acknowledges that this is another feasible means to reduce bat deaths. Lott, Tr. Vol. IX 2265, 2273. “Feathering” is turning the wind turbine blades to the side so that they do not catch the wind and will not rotate. Lott, Tr. Vol. IX 2265. The U.S. Fish and Wildlife Service has recommended feathering during wind speeds of seven meters per second or less for another wind farm project. Lott, Tr. Vol. IX 2266-67. Even feathering at wind speeds of 5.0 or 6.5 meters per second or less will reduce bat fatalities by 50% or more. Lott, Tr. Vol. IX 2277-78. There is no significant statistical difference between the mortalities at either speed, and both speeds are effective in reducing bat kills. Meinke, Tr. Vol. III 659-60. Limited electricity is produced at speeds below five meters per second. Shears, Tr. Vol. I 94-95. Consequently, requiring feathering at wind speeds of 5.0 or less will cause little loss of electrical production, and the Board should require feathering at these speeds.

Fifth, Buckeye Wind should submit a meaningful post-construction avian and bat mortality plan to prevent excessive bat deaths, not just watch the bats die. The Staff Report recommends that Buckeye Wind prepare a post-construction avian and bat mortality survey plan. Staff Report, Staff Exh. 2 at 61, Cond. 15. This is a standard recommendation in ODNR’s “On-Shore Bird and Bat Pre- and Post-Construction Monitoring Protocol for Commercial Wind Energy Facilities in Ohio” applicable to all wind power projects in the state. Meinke Dir., Applicant Exh. 7 Ans. 17; UNU Exh. 54. While a mortality survey plan is necessary to learn about the fatalities from Buckeye Wind’s turbines, as currently worded this condition does not prevent additional bat and bird deaths. Lott, Tr. Vol. IX 2282-84. It will only record the number of bats and birds that have died, and will not require Buckeye Wind to reduce unacceptable numbers of mortalities. Lott, Tr. Vol. IX 2283; Applic. at 166.

In fact, nothing in the Staff Report requires Buckeye Wind to limit its harmful impacts on bats and birds. Lott, Tr. Vol. IX 2283-84. This is inadequate under ODNR's monitoring protocol for wind farms, which recommends the inclusion of mitigation measures in the wind farm plans. UNU Exh. 54 at 13-14. ODNR's protocol recommends mitigation measures be required if fatality estimates for wind farm operation are unacceptably high. UNU Exh. 54 at 13. Indeed, Buckeye Wind expected the plan to include corrective measures and the other recommendations of the ODNR protocol. Meinke, Tr. Vol. III 661-62. Buckeye Wind's failure to include in its application such a plan for monitoring wildlife impacts and minimizing them violates its obligations under O.A.C. 4906-17-08(B)(3)(c) and (d). Buckeye Wind's plan, subject to OPSB approval, should identify the number of bird and bat fatalities deemed to be unacceptably high, and should specify the mitigation measures that Buckeye Wind must undertake to reduce these deaths to an acceptable number.

b. Buckeye Wind Should Not Be Allowed To Kill Or Destroy The Habitat Of Other Species Of Bats.

Buckeye Wind's consultant found seven species of bats in the Buckeye Wind proposed project area. Meinke, Tr. Vol. III 616. One such species is the Northern Myotis bat, a colony of which is located within the Buckeye Wind project area near a proposed turbine site shown by A1, A2, and A3 on Figure 3-2 of Application Exhibit K. Meinke, Tr. Vol. III 685; Lott, Tr. Vol. IX 2260-61. The nearby presence of a wind turbine may discourage the bats from continuing to use this area, not to mention increasing the bats' risk of death due to Buckeye Wind's turbines. Meinke, Tr. Vol. III 696-97. Buckeye Wind should not be allowed to construct the proposed turbine located closest to this colony.

Some of the mitigation measures applicable to Indiana Bats are also necessary to protect other bat species. Buckeye Wind should not be allowed to cut down trees in which the bats have

been known to roost or nest, including the trees in which the Northern Myotis colony has been found. The post-construction avian and bat mortality survey plan, including corrective measures addressing excessive fatalities, is equally necessary for all species of bats.

c. **Because Counting Birds At One Location In 84 Square Miles Cannot Adequately Assess The Wind Turbines' Risk To The Birds, The Application Should Be Returned To Complete The Task.**

Buckeye Wind has concluded that the wind farm will not kill an unacceptable number of birds. However, Buckeye Wind has insufficient data to make that conclusion given the limited scope of its avian study. Buckeye Wind employed only one radar station to detect migratory birds in a project area of 84 square miles. Meinke, Tr. Vol. III 612. And that radar station was not even located inside the present project area. *Id.*

Similarly, Buckeye Wind's raptor study evaluated the number of eagles, hawks, and other raptors passing through only one location in the 84 square mile study area. Applic. Exh. N at 34 and Fig. 4-1; Applic. Exh. O at 29 and Fig. 3-1. This location also is not within the current Buckeye Wind project area. Applic. Exh. N at Fig. 4-1; Applic. Exh. O at Fig. 3-1. The Board should return Buckeye Wind's application to Buckeye Wind to supplement its raptor survey before issuing any certificate for the wind farm.

Buckeye Wind's consultant reported one or two Bald Eagles in the project area, but Buckeye Wind has not determined whether any Bald Eagles nest in or near the project area. Meinke, Tr. Vol. III 672-77. The Board should return Buckeye Wind's application with instructions to supplement its avian study to ensure that no Bald Eagles are nesting within or near the project area.

As explained in the section of this brief discussing the protection of bats, the post-construction avian and bat mortality survey plan should identify the number of bird and bat

fatalities deemed to be unacceptably high. It also should specify the mitigation measures that Buckeye Wind must undertake to reduce excessive bird deaths to an acceptable level.

5. As The Wind Project Is Currently Configured, Its Environmental Damage Will Exceed Its Environmental Benefit.

Buckeye Wind's sole claim of environmental benefit is that the Project will offset emissions of greenhouse gases and other pollutants from other sources of electricity. As discussed above, Buckeye Wind's emission offset claims are not supported by reliable and probative evidence. Based on the evidence in this case, the true degree of environmental benefit from the Project cannot be ascertained.

On the other hand, there is ample evidence of the environmental harm that the Buckeye Wind Project would cause if permitted to operate as proposed in the Application. These impacts can be mitigated through appropriate siting, adequate setbacks, and other measures as described above. Unless these effects are mitigated, the Project will have significant detrimental impacts on the health and well-being of surrounding residents, as well as on the endangered Indiana Bat and other wildlife species in the Project area. Without such mitigation, the Board cannot determine that the facility represents the minimum adverse environmental impact, and a Certificate cannot be issued for the Project. R.C. § 4906.10(A)(3). Furthermore, without such mitigation, the Project would clearly be adverse to the public interest, convenience and necessity, which again would warrant denial of the Certificate. *Id.* at (A)(6).

B. While Buckeye Wind Has Failed To Introduce Admissible Evidence Of Its Project's Economic Benefit, The Buckeye Wind Project Will Impose Considerable Socioeconomic Damage On Its Neighbors And The Community.

1. The Applicant Introduced No Admissible Evidence To Support Its Assertion That The Wind Project Offers Socioeconomic Benefits.

The Application makes broad claims about the positive economic effects that the Project will have on Champaign County and surrounding counties. The primary source of those claims is a report of Buckeye Wind's consultant, Saratoga Associates. Applic. Exh. R. None of the Applicant's socioeconomic claims were supported at hearing by testimony of a witness with knowledge of the basis for those claims.

Instead, as was the case with the Application's emission offset claims, the socioeconomic portion of the Application was only "sponsored" by Mr. Shears of Everpower. Mr. Shears did not personally prepare Exhibit R, was not qualified as an expert in economics or socioeconomics, and was unaware of the basis for key claims in the Saratoga Associates report. Shears, Tr. Vol. I 54-55. For example, he did not know the basis for the job creation estimates on page 55 of Exhibit R (Shears, Tr. Vol. I 55), did not know how many construction workers would be employed locally (*id.* at 56), and had no understanding of the basis for the multipliers used to derive the employment predictions in Exhibit R (*id.* at 57). And although Exhibit R makes sweeping claims about the impact of the project on taxation, property values, and commercial and industrial development, Mr. Shears was not qualified as an expert in any of those fields.

As discussed more fully in Section VII(F) of this brief, the admission of this information into evidence was error and unlawfully reversed the burden of proof in these proceedings.

Exhibit R is unsupported by testimony by a witness with knowledge of its substance, and should be stricken in its entirety from the record.

2. The Wind Project Will Substantially Reduce The Value Of The Neighbors' Land And Homes.

Other than Application Exhibit R, there is scant evidence of any economic or socioeconomic benefit that the Buckeye Wind Project would provide. On the other hand, there is ample evidence concerning adverse economic and socioeconomic impacts—particularly with regard to property values and land use, including development.

Mr. Thomas Sherick, a real estate appraiser and Member of the Appraisal Institute (MAI), testified at hearing that the Buckeye Wind Project would result in a marked decrease in the value of properties near the wind turbines. Sherick Dir., UNU Exh. 22A at 15. Mr. Sherick's opinion was based on the following:

- (a) review of available literature, including three studies showing adverse impacts on property values (*id.* at 9-11);
- (b) consideration of the established and analogous impacts of high voltage transmission lines (HVTLs) on neighboring property values (*id.* at 12-15);
and
- (c) information from an Urbana real estate agent evidencing that the Buckeye Wind Project proposal is having a negative effect on market perception in Champaign County, even before a single turbine is constructed (*id.* at 11-12).

Based on that information, Mr. Sherick concluded that although the magnitude of the Project's impact will vary depending on property type and proximity to turbines, the Project would reduce the value of vacant land by at least 6.5 % and the value of parcels with development potential by

as much as 50%. He also opined that home values in the vicinity of the Project would decrease at least 10%. Sherick Dir., UNU Exh. 22A at 15.

Mr. Sherick noted three separate studies finding that industrial wind energy facilities have had an adverse effect on nearby properties--

- A 2009 report by Appraisal Group One of Calumet County, Wisconsin, evaluated the effect of several Wisconsin wind power facilities on nearby property values. UNU Exh. 25. The study used three independent measures of property value effects--a review of available literature about wind turbines' effects on property values, an opinion survey of local realtors, and sales studies that compared vacant residential lot sales within the wind power facilities to comparable sales outside the area of the turbines' influence. *Id.* at 2. Its study of the area around the Blue Sky Green Field Wind Energy Center found that the impact of the wind turbines decreased surrounding land values from 19% to 74%, with an average of 40%. *Id.* at 36. Its study of the area near the Forward Wind Energy Center found that the wind turbines decreased land values from 12% to 47%, with an average of 30%. *Id.* at 42. *See also* Sherick Dir., UNU Exh. 22A at 9.
- The report of Kevin L. Zarem, MAI, titled "Appraisal Consulting Report, Forward Wind Project, Dodge County, Wisconsin," concluded that the "view loss" due to wind turbines is analogous to the "view loss" indicated by proximity to transmission lines. UNU Exhibit 26. Mr. Zarem used paired-sales analyses to determine that residential lots affected by transmission lines exhibited 17% to 20% in land value loss. *Id.* at 11. Mr. Zarem concluded that the same measured effect would apply to the impact of wind turbines on property values. *Id.* He goes on to note that distance alone is not a sole

predictor of “view loss” due to the potential differences in topography and/or terrain. *Id.* at 12.

- Presentation materials prepared by Gardner Appraisal Group, entitled “Impact of Wind Turbines on Market Value of Texas Rural Land,” also find that industrial wind power projects have a measurable, negative effect on property values. Sherick Dir., UNU Exh. 22A at 10. Specifically, Gardner Appraisal concludes that the impact of the wind turbines situated on a property will decrease the value of that property from 29% to 45%, with an average of 37%. Also, it concludes that the impact of the wind turbines situated within 0.2 to 0.4 mile of a property will decrease its value from 17% to 35%, with an average of 26%. Finally, it concludes that the impact of the wind turbines situated within 1.8 miles of a property will decrease its value from 15% to 34%, with an average of 25%. *Id.* While Mr. Sherick acknowledged that there are inherent geographical and cultural differences between the Texas and Champaign County real estate markets, the work of Gardner Appraisal is important because it assesses the effect of turbine proximity based on actual paired-sales data for properties at differing distances from turbines. *Id.* Thus, Gardner Appraisal was able to measure the effect of proximity in a way that Mr. Zarem and other studies were unable to do. *Id.*

On the other hand, the Applicant’s consultant, Saratoga Associates, merely states that “there is no definitive understanding or conclusion on the impact that a wind power development has on property values.” Applic. Exh. R at 93. Saratoga Associates cited only two studies in support of this conclusion. One study concerned the impacts of wind turbine visibility on home values in Madison County, New York. *Id.*, citing Hoen, Ben, “Impacts of Windmill Visibility on Property Values in Madison County, New York” (May 2006). That study evaluated the impact

of wind turbines on homes within a one-mile radius and five-mile radius of the turbines, concluding that there was no adverse impact on property values. *Id.* Mr. Sherick described this study as “fundamentally flawed” for several reasons. First, because the study did not consider any homes closer than 4,000 feet from a wind turbine, it failed to account for the impact of turbines in closer proximity to homes. Sherick, Tr. Vol. VI 1342. Second, although the study considered home sales from 1996 to 2005(*id.* at 1297), it failed to consider the effect of changes in real estate market conditions over that period (Sherick Dir., UNU Exh. 22A at 6). In other words, if the overall property values in that region of New York appreciated dramatically over the same period, such a trend might mask any negative valuation impacts resulting from proximity to the wind turbines.⁷

The second study cited by Saratoga Associates is an unidentified study by Poletti and Associates. Applic. Exh. R at 93-94. The UNU Intervenors and Mr. Sherick were unable to locate a copy of this study, and the Applicant was unable to produce a copy in response to a discovery request. Therefore, Mr. Sherick was unable to review a copy of this report. However, the report of Mr. Michael Miller of EPIC Consulting concluded that the statistical analysis in the Poletti study could not provide a basis for statistically sound conclusions. Sherick Dir., UNU Exh. 22A at 7; UNU Exh. 23. Furthermore, even Mr. Poletti has acknowledged that people prefer country views to a view of a wind farm. Sherick Dir., UNU Exh. 22A at 7; UNU Exh. 24. This is a significant concession, given Mr. Sherick’s observations about the paramount role of perception in the real estate market. *See infra* at 76.

⁷ These criticisms also apply to the Renewable Energy Policy Project (REPP) study discussed during Mr. Sherick’s cross-examination. *E.g.*, Sherick, Tr. Vol. VI 1286 (REPP considered sales in a five-mile radius); Sherick Dir., UNU Exh. 22A at 6, 8; UNU Exh. 26 at 5-6. Furthermore, 70% of the data used in the REPP study was found to relate to transactions between related parties, and therefore is not representative of market value. *Id.* at 5. Remarkably, 72% of the data used in the REPP report did not even involve properties with actual views of wind turbines—the very effect that the report was testing. *Id.*

Mr. Sherick next considered the analogous impacts of high-voltage transmission lines (HVTLs) on neighboring property values. Real estate appraisers generally agree that HVTLs have a negative impact on nearby property values. Sherick, Tr. Vol. VI 1339. He offered two specific examples from reliable “paired sales analyses”⁸ of two different real estate developments in southwest Ohio, both of which were situated near HVTLs.

- In the first example, Wellington Estates (Warren County), the proximity of HVTLs reduced the value of nearby vacant land (i.e., land that has not been subdivided for development) by 6.5%, development lot values by 52.6%, and home values by 9.5%. *Id.* at 14.
- In the second example, Colonial Manor Square (Butler County), the proximity of HVTLs reduced lot values by 48.8%. Because the developer of Colonial Manor stated that lot price was 17.9% of home price, the effect of transmission lines on home values in that development was approximately 8.7%.

These case studies of the analogous property value impacts of HVTLs illustrate how aesthetic impacts and perceived nuisances can affect property values. Mr. Sherick is of the opinion that the negative effects of wind turbines on property values will be at least as great as the effects of HVTLs. *Id.* at 15. He notes, however, that there is reason to believe that the wind turbines proposed for the Buckeye Wind project will have a greater negative impact on property values than HVTLs. For instance, the turbines proposed for the Buckeye Wind project may be up to 492 feet tall, while HVTL towers are typically 100 feet to 150 feet tall. Wind turbines also will have a more obtrusive effect on the landscape due to their blades’ rotation. Wind turbines

⁸ A paired sales analysis is a quantitative method of extracting comparative data from a pair of similar properties that have sold or rented, one of which is affected by the stimulus in question, the other is not. Sherick Dir., UNU Exh. 22A at 11.

are also known to have unique, adverse sensory impacts on neighboring properties such as noise and shadow flicker. *Id.* at 16.

Mr. Sherick opined that it is not possible to measure the actual impact of wind turbines in Champaign County with precision through a paired sales analysis, because there currently are no turbines in Champaign County. *Id.* at 11. Nonetheless, Mr. Sherick did find paired sales information suggesting that the proposal for the Buckeye Wind Project is affecting the Champaign County real estate market in a negative manner, before a single turbine is constructed. Mr. Sherick obtained this information from Mr. Patrick Hamilton, a realtor with RE/MAX Leading Edge Realty in Urbana. *Id.* One of Mr. Hamilton's clients ruled out the purchase of a home on South Ludlow Road, Union Township, Champaign County when the client learned that the home was within the viewshed of the Buckeye Wind Project. *Id.* at 11-12. At the time the client viewed that home, the asking price was \$399,000. *Id.* The home had been on the market since May of 2008 and, as of the date of Mr. Sherick's testimony, had not yet sold.⁹ *Id.* The same client was also interested in a similar property located on Metz Road in Wayne Township, which property was unaffected by the Buckeye Wind Project. Although the client did not purchase that home due to financing considerations, the home subsequently sold in October of 2008 for \$370,000. *Id.* At the time of Mr. Sherick's testimony, the asking price of the unsold property on South Ludlow Road had been reduced to \$369,000. *Id.* He believed that the Ludlow Road property would sell for even less than that asking price. Sherick, Tr. Vol. VI 1355.

Based on this information from the Champaign County market, Mr. Sherick testified that the Buckeye Wind Project has in fact impaired the market perception of properties around the

⁹ Mr. Sherick stated that in this economy it is common for a property to be on the market for a substantial period of time, but that marketing a property for over a year is "excessive" in the context of the Champaign County real estate market. Sherick, Tr. Vol. VI 1358.

proposed site of the Project. He further testified that market perception is “paramount” to the analysis of property value impacts (*id.* at 1336), because negative market perception can result in the following negative effects on prices:

- If a number of people decide they do not want to live near wind turbines, they will move out and flood the market with more supply, resulting in decreased property values. *Id.* at 1279.
- It may also negatively affect the desirability of, and demand for, housing in Champaign County. *Id.* Champaign County is both an agricultural community and rural residential community for commuters as well as retirees. *Id.* at 1348. Mr. Sherick noted that until the recent economic downturn, Champaign County was poised to benefit from a “significant influx of new . . . housing” due to the area’s proximity to Honda of America and Wright-Patterson Air Force Base. *Id.* at 1279. Construction of a swath of 70 industrial wind turbines across eastern Champaign County will likely diminish the desirability of Champaign County for these new residents.

In the latter respect, Champaign County is distinguishable from more rural agricultural communities such as Benton County, Indiana, which is entirely dependent on its agricultural economic base and does not serve as a bedroom community for commuters. *Cyr, Rebuttal Tr. Vol. II 2486.* Residential property in the unincorporated portions of Benton County is “pretty sparse.” *Barce, Rebuttal Tr. Vol. II 2431.* In the past ten years, the unincorporated area of Benton County has seen only one new residential subdivision of ten or more homes, and only about five subdivisions of two homes. *Id.* at 2446-47. According to Judson Barce, farming is “far and away the greatest thing we use our land for, and residential people stick to the towns pretty much.” *Id.* Furthermore, it is noteworthy that 90% of the farm-owning population of

Benton County is participating in a wind power project through either a lease or a lease option. *Id.* at 2449-2450. Given the high level of economic interest in wind projects, the sparse residential usage in the townships, and the lack of demand for Benton County homes by commuters, it is little surprise if Benton County land values have not suffered as a result of wind development. So Benton County's experience provides no reliable guide to the impact of wind development in Champaign County.

Based on his evaluation of relevant literature, the Champaign County real estate market, and the analogous negative impact of HVTLs on nearby property values, Mr. Sherick believes that the Buckeye Wind Project would likely diminish the value of nearby vacant land by at least 6.5%, the value of nearby homes by at least 10%, and the value of nearby parcels with development potential by as much as 50%. Sherick Dir., UNU Exh. 22A at 15. The magnitude of that impact will likely vary in proportion to a property's proximity to one or more turbines. *Id.*

The Staff did not consider the Project's effect on property values when it issued its report. Siegfried, Tr. Vol. VIII 1833. However, such significant impacts on the property values of Champaign County residents cannot be ignored, and a project that would cause such dramatic impacts would not serve the public interest, convenience, and necessity under R.C. § 4906.10(A)(6). If the Power Siting Board is to approve the Certificate for the Buckeye Wind Project, strong mitigating conditions must be in place to prevent Champaign County families from losing significant equity in their homes and other properties as a result of proximity to the Project. To this end, the UNU Intervenors urge that any Certificate for this Project include a condition requiring the Applicant to offer to nonparticipating landowners price protection in form of a Property Value Protection Agreement. A suggested form of such an Agreement is

attached to this brief as Exhibit A. Any such agreement should establish a fair mechanism for establishing the fair market value of properties within three-quarter mile of any turbine in the Project. It should further obligate Everpower Wind Holdings, LLC to compensate eligible property owners in the event they are unable, using reasonable means, to sell their property for the established fair market value.

The notion of mitigating property value loss is not a novel concept in the wind industry. Everpower's own trade organization, the American Wind Energy Association (AWEA), recommends that "developers should work with individual landowners to discuss mitigative measures, if any, to protect property values and preserve the integrity of the property. Shears, Tr. Vol. I 134; UNU Exh. 41, § 5.7.2.2. Nonparticipating neighbors of the Project should not be expected to bear financial loss while the Applicant and its leaseholders reap only the benefits. An appropriate Property Value Protection Agreement would ensure that the Applicant bears both the benefits and the burdens of its venture.

3. **The Board's Failure To Require Buckeye Wind To Maintain An Adequate Distance Between The Project's Wind Turbines And Neighboring Property Lines Would Impair The Neighbors' Rights To Develop And Use Their Properties, Thus Taking Their Property Rights Without Compensation.**

The diminution of property values is not the only impact that the Project will have on neighboring land and residences. Of equal significance is the fact that the Project, as currently configured, will significantly impair the ability of neighboring landowners to utilize their property to its highest and best use. The use of setback distances measured from neighboring residences, as opposed to neighboring property lines, exacerbates this problem. Approval of the Buckeye Wind Project as currently configured would inevitably result in litigation claiming unconstitutional takings of private property.

The testimony of Sandra McKew addresses these land use concerns.¹⁰ Ms. McKew is a professional land use planner with 40 years of experience in land use planning, zoning regulations, fiscal impact analysis, farmland preservation planning, and development of strategic approaches to address sustainable growth management. McKew Dir., UNU Exh. 19A at 2. She was appointed by Governor Voinovich as the planning representative on the Ohio Farmland Preservation Task Force (*id.*), on which she served from 1996-97 (McKew Dep., UNU Exh. 66 at 13). She is a member of the National Wind Coordinating Collaborative funded by the U.S. Department of Energy, and in 2007 she provided professional planning assistance to the Ohio Wind Working Group under contract with the Ohio Department of Development. McKew Dir., UNU Exh. 19A at 2. Ms. McKew is eminently qualified to address land use concerns affecting Champaign County, having drafted both the Champaign County Farmland Preservation Plan and the Champaign County Comprehensive Land Use Plan. *Id.*; McKew Dep., UNU Exh. 66 at 14-15.

Although Ms. McKew describes herself as pro-wind development (*id.* at 26), she sees several major problems with the adequacy of the proposed Buckeye Wind Project from the perspective of land use planning. First and foremost, she believes it is inappropriate to measure wind turbine setbacks from nearby residences in areas such as Champaign County where zoning allows for multiple permitted uses. McKew Dir., UNU Exh. 19A at 9. For example, Union Township is primarily zoned R-1 (Low Density Residential) and U-1 (Rural District). The latter zoning designation allows, as a principal permitted use, residential development of one unit per two acres. *Id.* at 10. This is not agricultural zoning, and the Application inaccurately characterizes the proposed site of the Project when it describes the area as agriculturally zoned.

¹⁰ Ms. McKew was unavailable to testify at the hearing due to serious a serious medical condition requiring immediate hospitalization. Her written direct testimony and deposition transcript were admitted in evidence based on stipulations of counsel for all parties concerning her unavailability. Tr. Vol. V 1164.

Id.; Applic. at 4. Rather than preserving undeveloped land exclusively for agriculture, the zoning of Union Township actually confers residential development rights on owners of large parcels. McKew Dir., UNU Exh. 19A 10.¹¹

Therefore, Ms. McKew observed that how an area is zoned and what rights that zoning confers are critical issues. McKew Dep., UNU Exh. 66 at 90. Chris Cunningham of the Board's Staff, however, was completely unaware of the nature of local zoning in Union Township when he wrote the portion of the Staff Report on socioeconomic impacts. Testimony of Chris Cunningham ("Cunningham"), Tr. Vol. VII 2013. Given that lack of knowledge, it was not surprising that Mr. Cunningham could not determine the impact that the Buckeye Wind Project might have on development of nearby nonparticipating parcels. *Id.* 2012-13.

Development rights can be impaired significantly through improper establishment of setbacks to mitigate turbine effects such as noise, shadow flicker, and ice throw. McKew Dir., UNU Exh. 19A at 10. Although R.C. 4906.20(B)(2) and O.A.C. § 4906-17-08(C)(1) prescribe minimum setbacks from residences on adjacent property, such setbacks do not mitigate the adverse effects of the turbine on the portion of the property between the residence and the turbine. *Id.* This can render otherwise developable land unsuitable for development due to the encroachment of these harmful turbine impacts across the neighboring property line. *Id.*

Ms. McKew illustrated this effect on maps marked UNU Exhibits 20 and 21. Exhibit 20 is a map that illustrates the potential effect of residence-based setbacks for each of the proposed Buckeye Wind turbines in Union Township. It shows two alternative setbacks from neighboring residential structures—the 914 foot minimum setback referenced in the Application, and the

¹¹ When Ms. McKew was working on farmland preservation issues and advocated the concept of true agricultural zoning, the people who most resisted that concept were farmers who wanted to retain their option to sell off pieces of land for development when they needed money. McKew Dep., UNU Exh. 66 at 89. Accordingly, preserving the value of land for this purpose is important not only to the farmers and non-farmers not participating in the Project, but also to the participating farmers.

1,640-foot setback recommended by turbine manufacturer Nordex in its micro-siting guidance. *Id.*; *see also* UNU Exh. 12 (Nordex guidance). Yellow outlines indicate boundaries of nonparticipating landowners. In a number of instances, one or both of the setback zones extend onto non-participating properties. McKew Dir., UNU Exh. 19A at 11.

Exhibit 21 is a specific case study showing how a nonparticipating adjacent property—in this case, the property of Julia Johnson—can be affected when setback distances are allowed to encroach across property lines. *Id.*; Johnson Dir., UNU Exh. 1A at 11. Ms. Johnson’s property is adjacent to the Urbana Country Club golf course, and she is aware that there is interest in building homes on that property. *Id.* at 13. As shown on Exhibit 21, nine acres of her property are within the 914-foot setbacks for proposed turbines 48 and 49. McKew Dir., UNU Exh. 19A at 12. A 1,640 foot setback would encroach upon about 70 acres of Ms. Johnson’s property. The latter scenario would impair the future development potential of fully 33 percent of the total 214 acres. *Id.*

It was not Ms. McKew’s intent to suggest that the Board should apply bare minimum setbacks in order to minimize how development may be limited on adjacent nonparticipating properties. *Id.* Rather, Ms. McKew’s point is that any appropriate setback intended to mitigate impacts on neighbors should either be measured from adjacent property lines, or the nonparticipating landowner should be appropriately compensated for the impacts to his or her property due to the encroachment of the setback. *Id.* The latter can be accomplished by requiring Buckeye Wind, as a condition of the Power Siting Certificate, to obtain a wind conservation easement from each affected nonparticipating landowner. McKew Dep., UNU Exh. 66 at 101-02. Similar to other conservation easements, a wind conservation easement

would establish the affected area, provide for no (or limited) future development on that area, and provide compensation to the party granting the easement. *Id.* at 102.

Ms. McKew observed that the impact of the Buckeye Wind Project on future development is an issue of tremendous import that has been overlooked entirely both in the Application and in the Staff Report. McKew Dep., UNU Exh. 66 at 70. This is an issue with serious constitutional ramifications. Both the U.S. and Ohio Constitutions prohibit the state from taking private property for public use without just compensation. U.S. Const. Amend. V, XIV; Ohio Const. Art. I, Sec. 19. The guarantee of the Takings Clause was intended to bar the government from forcing some people alone to bear public burdens that, in all fairness and justice, should be borne by the public as a whole. *Pennell v. City of San Jose*, 485 U.S. 1, 8-9 (1988); *Armstrong v. United States*, 364 U.S. 40, 49 (1960).

More to the point, both the federal and Ohio constitutions forbid the state to take private property for the sole benefit of a private individual, even when just compensation for the taking is provided. *Norwood v. Horney*, 110 Ohio St.3d 353 (2006), citing *O'Neil v. Summit Cty. Bd. of Commrs.*, 3 Ohio St.2d 53, 57 (1965); *Kelo v. New London*, 545 U.S. 469 (2005). This venerable principle was aptly described by the Supreme Court of West Virginia as follows:

We would do nothing to hinder the development of the state, nor to cripple the railroad companies in assisting such development, but at the same time we must protect the private property rights of the citizens. All that to which the corporations are entitled under a proper construction of the law they will receive; *but they must not, for their own gain and profit, be permitted to take private property for private use.*

Pittsburgh, Wheeling & Kentucky R.R. Co. v. Benwood Iron-Works, 321 W. Va. 710 (1888) (emphasis added).

If the Power Siting Board authorizes the Applicant to site and construct wind turbines in a manner that effectively eliminates development rights of adjoining landowners by extending

turbine setbacks across their property, the Board will have unlawfully sanctioned the taking of private property for private use in violation of the Fifth and Fourteenth Amendments to the U.S. Constitution and Article I, Section 19 of the Ohio Constitution.

And even if it is argued that such a taking is for public rather than private use, such a taking would be equally unlawful without first affording just compensation to the affected landowners. In addition to government sanctioned physical encroachments onto land, which are deemed *per se* takings (*Lingle v. Chevron USA, Inc.*, 544 U.S. 528 (2005), *State ex rel. Shelly Materials, Inc. v Clark County Comm'rs*, 115 Ohio St.3d 337 (2007)), a government action (such as a regulation) may have such an onerous effect on private property that it is tantamount to a condemnation, and such a taking may be compensable. *Id.* See also *Pennsylvania Coal Co. v. Mahon*, 260 U.S. 393 (1922). Where such a government action deprives a landowner of the entirety of the property's economically viable use, such regulation is also deemed a taking *per se*. *Shelly Materials*, 115 Ohio St.3d at 341. Where, on the other hand, a government action deprives the landowner of less than 100% of the property's economically viable use, the takings analysis requires consideration of three factors: (1) the economic impact of the government action on the claimant, (2) the extent to which the action has interfered with distinct investment-backed expectations, and (3) the character of the governmental action. *Id.*; *Penn Cent. Transp. Co. v. City of New York*, 438 U.S. 104, 124 (1978).

In light of these principles, the Power Siting Board risks venturing into a morass of constitutional takings litigation if it authorizes the siting of wind turbines in a manner that deprives an adjacent landowner of property rights (such as development rights). Furthermore, although Ohio case law has not determined whether a landowner's wind power rights are subject to condemnation or taking, at least one other state has found that they are. *Contra Costa Water*

District v. Vaquero Farms, Inc., 58 Cal. App. 4th 883 (Cal. App. 1st Dist. 1997). Turbines need to be spaced four to five rotor diameters apart in order to minimize wind loss to other turbines. Shears, Tr. Vol. I 102. Therefore, if a turbine is located too close to a neighboring property, its proximity may interfere with the neighbor's right to develop his or her own wind resources. And, similar to the issue of development rights discussed above, such interference may rise to an unconstitutional taking of property rights if sanctioned by an instrument of state government such as the Ohio Power Siting Board.

For all of the above reasons, the Board must proceed with great caution in establishing setbacks for the Buckeye Wind Project. Given the presence of conflicting land uses and land rights in the townships that would host the Project, the most prudent course of action would be to measure all setbacks for mitigation of noise, blade and ice throw, and other project effects and hazards from adjoining property lines, as opposed to neighboring residences. In the alternative, if the Board deems it appropriate to base setbacks on proximity to neighboring residences, the Board should require the Applicant, as a condition of a Certificate issued in this case, to demonstrate that it has adequately compensated any nonparticipating property owner for deprivation of property rights resulting from encroachment of the setbacks.

4. The Project Will Impose Other Socioeconomic Damage On The Community.

Although Buckeye Wind touts the Project's putative economic benefits, neither the Application nor the Staff Report acknowledge the Project's negative effects on present and future development value and associated tax potential that may result from inappropriate siting of wind turbines. McKew Dir., UNU Exh. 19A at 12. Similarly, although the Staff Report notes construction of the Project could limit future commercial and residential development in the project area (Staff Exh. 2 at 25), neither the Application nor the Staff Report consider the lost

revenue and associated taxes from the impairment of commercial development and homebuilding in the Project Area.

Furthermore, neither the Application nor the Staff Report acknowledges that the Project, as currently configured, is directly in the path of planned growth of the City of Urbana. Testimony of Melanie Kendrick (“Kendrick”), Tr. Vol. VI 1501. Similarly, neither the Application nor the Staff Report addresses or acknowledges the negative economic impacts of the Project on Urbana’s Grimes Field, or the public health implications resulting from the Project’s interference with emergency medical helicopter operations out of Grimes Field. In fact, Nick Doss, the author of the aviation portion of the Staff Report, admitted that his review of impacts on Grimes Field amounted to a five-minute “windshield tour” from the airport parking lot. Doss, Tr. Vol. IX 2075, 2077-78. The UNU Intervenors anticipate that the City of Urbana will address the economic impacts of the Project on the City more fully in its initial brief.

IV. THE MINIMUM SETBACKS RECOMMENDED BY THE STAFF ARE INADEQUATE TO MITIGATE THE ADVERSE EFFECTS OF THE PROJECT ON NONPARTICIPATING NEIGHBORS.

It is disappointing that, despite widely-available information on the environmental and socioeconomic impacts of wind-energy facilities, and despite Ohio’s inexperience with industrial-scale wind energy facilities, the Staff Report did not advocate setback distances greater than the bare minimum setbacks required by law. Staff Exh. 2 at 37. Given the abundance of setback-related evidence offered during the hearing in this case, however, the Board now has a great deal of information to help assess appropriate setbacks for the Project’s turbines. In light of that evidence, adoption of the minimum setbacks under Ohio law would be arbitrary, unreasonable, and contrary to the health, safety, and well-being of the host communities.

As the Board is aware, the minimum setbacks recommended in the Staff Report are based on formulas originally established by the Ohio General Assembly in 2008. Am. Sub. H.B. 562 (2008). That law directed the Board to establish rules for wind energy facilities with an aggregate rated generating capacity of five or more megawatts. *Id.* (R.C. § 4906.13(A)). In those rules, the General Assembly further directed the Board to include the following minimum setback requirements:

The rules also shall prescribe a minimum setback for a wind turbine of an economically significant wind farm. That minimum shall be equal to a horizontal distance, from the turbine's base to the property line of the wind farm property, equal to one and one-tenth times the total height of the turbine structure as measured from its base to the tip of its highest blade and be at least seven hundred fifty feet in horizontal distance from the tip of the turbine's nearest blade at ninety degrees to the exterior of the nearest, habitable, residential structure, if any, located on adjacent property at the time of the certification application.

Id. (R.C. § 4906.20(B)(2)).

In response to H.B. 562, in 2009 the Board adopted rules governing wind-powered electric generating facilities. O.A.C. Chapter 4906-17. The wind power rules included minimum setback requirements that mirrored those in H.B. 562:

(1) Land uses. The applicant shall:

* * *

(c) Describe proposed locations for wind turbine structures in relation to property lines and habitable residential structures, consistent with no less than the following minimum requirements:

(i) The distance from a wind turbine base to the property line of the wind farm property shall be at least one and one-tenth times the total height of the turbine structure as measured from its tower's base (excluding the subsurface foundation) to the tip of its highest blade.

(ii) The wind turbine shall be at least seven hundred fifty feet in horizontal distance from the tip of the turbine's nearest blade at ninety degrees to the exterior of the nearest habitable residential structure, if any, located on adjacent property at the time of the certification application.

O.A.C. § 4906-17-08(C)(1)(c). In response to UNU's objections that there are no circumstances under which these minimum setbacks would be adequately protective, the Board responded as follows:

The Board finds that Rule 4906-17-08(C)(1)(c) is consistent with the statutory language regarding minimum setbacks set forth in Section 4906.20(B)(2), Revised Code. Further, the Board and Board Staff will evaluate setbacks in association with each application on a case-by-case basis, in light of the specific wind-powered electric generation equipment selected for the proposed facility and impose conditions for setbacks as the Board determines to be appropriate.

In the Matter of Adoption of O.A.C. Chapter 4906-17, No. 08-1024-EL-ORD, Opinion and Order at 48, ¶ 145 (Oct. 28, 2008).

For any wind project, a case-by-case assessment of setback distances is critical, particularly because there is no scientific or practical justification for the setback from residences established in H.B. 562. While it is evident that the setback from property lines is intended to prevent turbines from collapsing onto adjacent properties, neither H.B. 562 nor Chapter 4906-17 provides any insight into the justification for the residential setback formula. Stuart Siegfried, the author of the setback discussion in the Staff Report, testified that he was unaware of the basis for the minimum setbacks in H.B. 562 or whether there was any scientific or health-based justification for the minimum setback from residences. Siegfried, Tr. Vol. VIII 1826. In fact, despite repeated questioning, Mr. Siegfried would not acknowledge whether the Staff even conducted an independent evaluation to determine whether that minimum setback would be adequately protective. *Id.* at 1827-29. Given the apparent lack of any health-based or scientific justification for the minimum setback from residences, neither the Board nor the Staff may default to the minimum setback formula simply because it is in H.B. 562 and the Board's rules.

The Board must determine that any setback established for the Buckeye Wind Project will be protective of the public.

The Staff's evaluation of setbacks in the Staff Report overlooked important project-specific information that would have alerted them that the minimum statutory setbacks are inadequate in this case. This is not entirely the Staff's fault. It is due in part to Buckeye Wind's failure to disclose relevant manufacturer siting recommendations. Mr. Shears testified that he was aware of Nordex micro-siting guidance that states as follows:

It is important to keep a distance to the next residences in order to not disturb the inhabitants by noise emission and shadow flickering of the turbine. Normally there have to be at least 500 m¹² between the WTG and the next residence.

UNU Exh. 12. Yet, though this was siting guidance from the manufacturer of two of the turbine models that Buckeye Wind is considering, Mr. Shears dismissed it as not "particularly relevant." Shears, Tr. Vol. I 103-04. The document was not provided to the Power Siting Staff. *Id.*; Siegfried, Tr. Vol. VIII 1825.

The Staff was also unaware of safety regulations of turbine manufacturer Vestas advising that individuals not stay within a 1,300 foot radius of a turbine unless necessary. UNU Exh. 13; Siegfried, Tr. Vol. VIII 1824. Nor was the Staff aware of guidance from GE Energy providing a formula for calculating a safe siting distance for ice throws. UNU Exh. 14; Siegfried, Tr. Vol. VIII 1825-26; Testimony of Andrew Conway ("Conway"), Tr. Vol. VIII 1992-93. Based on the turbine dimensions provided in the Application (Applic. at 13), the GE ice throw formula yields

¹² 500 meters is equivalent to 1,640 feet.

a safe siting distance of 984 feet¹³—far greater than the minimum property line setback of 541 feet discussed in the Staff Report (Staff Exh. 2 at 37).

The UNU Intervenors do not endorse the manufacturer recommended setbacks because far greater setbacks of 1.25 or 2.0 miles are necessary to protect neighbors from unacceptable noise levels. But where the turbine manufacturers themselves have issued safety recommendations calling for setbacks greater than the minimums required by Ohio law, it should be abundantly clear that Ohio's minimum setbacks are inadequate. In light of the overwhelming evidence that the H.B. 562 minimum setbacks are inadequate to protect public health, safety, and welfare in this case, the Board has a duty to establish greater setbacks in accordance with the evidence.

V. **IF A CERTIFICATE IS ISSUED FOR THE BUCKEYE WIND PROJECT, THE UNU INTERVENORS REQUEST A CONDITION PROHIBITING THE INSTALLATION OF SURVEILLANCE CAMERAS ON TURBINES.**

Richard James' experiences with other wind farms reveal that some wind farms install surveillance cameras on their turbines that can be and sometimes are used to watch the properties of adjoining neighbors. James Dir., UNU Exh. 31A, Ans. 81, 82. Any use of surveillance cameras at Buckeye Wind's turbines would violate the privacy of nearby neighbors given the closeness of Buckeye Wind's turbines.

Mr. Shears disclaimed any intent to install surveillance cameras on Buckeye Wind's turbines, and testified that he would not object to a condition in Buckeye Wind's certificate prohibiting the installation of cameras on the turbines. Shears, Tr. Vol. I 151. In the event the Board issues a certificate for the Buckeye Wind Project, the UNU Intervenors request that such a condition be included in the certificate to make Mr. Shear's commitment legally binding.

¹³ The GE document offers the following formula for calculating a safe setback distance with regard to ice throw: $1.5 \times (\text{hub height} + \text{rotor diameter})$. UNU Exh. 14. According to the Application, both the rotor diameter and hub height of the proposed turbines will be a maximum of 328 feet. Applic. at 13.

VI. IF A CERTIFICATE IS ISSUED FOR THE BUCKEYE WIND PROJECT, THE BOARD SHOULD REQUIRE STRINGENT REQUIREMENTS TO ENSURE ADEQUATE DECOMMISSIONING OF WIND TURBINES.

The testimony of John Stamberg, P.E., underscores the importance of an adequate financial assurance mechanism to ensure thorough and prompt decommissioning of wind turbines at the end of their useful lives or at the conclusion of facility operations. Mr. Stamberg is a registered professional engineer with experience in the review of decommissioning plans for wind energy facilities, as well as for mining, industrial, and commercial operations. Direct Testimony of John Stamberg (“Stamberg Dir.”), UNU Exh. 27A at 3. In summary, Mr. Stamberg testified concerning the risks and uncertainties in estimating decommissioning costs, the need for an appropriate financial assurance mechanism to account for those risks and uncertainties, and the importance of involving host community representatives in the process of reviewing and approving the financial assurance mechanism.

According to Mr. Stamberg, an appropriate decommissioning plan should specify how the turbines and other wind energy equipment will be removed, and the land returned to its original state, upon termination of a wind power lease or in the event of developer bankruptcy, abandonment of a turbine, or other prolonged stoppage of the project. *Id.* at 4. The decommissioning plan should be coupled with a financial assurance mechanism, such as a decommissioning bond, to ensure that the host community is not left with the cost and burden of dismantling abandoned turbines and ancillary facilities. *Id.*

The risk of facility abandonment is not an idle concern. Mr. Stamberg testified concerning several older wind projects that were abandoned in place in California, as well as the bankruptcies of several wind developers. *Id.* Moreover, the market for wind power facilities in Ohio is far from stable. Wind power generation is an entirely new industry in Ohio—an industry

that is both rapidly evolving and heavily dependent on government subsidies. And the cost of decommissioning wind turbines is considerable. If an entire wind farm is being decommissioned, the cost can be as much as \$300,000 per turbine. Stamberg, Tr. Vol. V 1118. For individual turbines, decommissioning costs can be even higher. *Id.* For these reasons, the Board should take a conservative approach with regard to decommissioning requirements in order to protect Champaign County from the prospect of having scores of 500-foot wind turbines abandoned in place.

A. The Board Should Require A Financial Assurance Bond Sufficient To Pay For Decommissioning If Demolition Costs Increase Or Scrap Metal Prices Decrease.

Net decommissioning costs for wind turbines can fluctuate significantly over time due to significant price volatility in the scrap metal market. Stamberg Dir., UNU Exh. 27A at 8, 10. For example, UNU Exhibit 29 shows that between October of 2004 and July of 2009, the average price for scrap copper swung from just over \$1/lb to over \$4/lb. For this reason, it is important that the financial assurance requirements be sufficient to ensure that financial assurance is adequate throughout the Project's life.

Although the Staff's proposed decommissioning conditions require a consideration of "contingency costs," such contingency costs are capped at no more than 10% of the calculated reclamation cost. Staff Exhibit 2A. Mr. Doss of the Staff was unable to state whether this 10% cap on "contingency costs" would adequately account for scrap price fluctuations, other than to observe that the cap was based on the requirements of another unspecified state. Doss, Tr. Vol. IX 2210.

Similarly, though the Staff's proposal states that "at no point shall the net decommissioning funds be less than 25% of decommissioning costs," (Staff Exh. 2A), Mr. Doss

could not justify how the 25% figure was assured to be adequate to cover net decommissioning costs (Doss, Tr. Vol. IX 2117). Although he was aware that scrap values “fluctuate a lot” (*id.* at 2208), he was unaware whether there is a source for global scrap prices, whether there is a difference in price between primary virgin metal and scrap metal, and whether there is any difference in price paid for scrap at the demolition site versus scrap delivered to the recycler (*id.* at 2206-2207). He was also unaware that, due to the turbines’ enormous size, they would have to be cut up to market them for scrap. *Id.* at 2208. Despite this demonstrated lack of knowledge of scrap markets, he did not feel it was necessary to modify the 25% figure in Staff Exhibit 2A. *Id.* at 2207. Again, his only justification for the 25% figure was to refer to unspecified requirements of an anonymous state. *Id.* at 2117.

There is no reasonable assurance that either the Applicant’s or the Staff’s proposed decommissioning plans will adequately cover fluctuations in decommissioning costs over the lifetime of the decommissioning cost estimate. Mr. Stamberg recommended two alternatives to correct this problem. First, the Board could require financial assurance in the form of a performance bond that requires the bonding company to actually commit to completing the decommissioning pursuant to an agreed scope of work. Stamberg Dir., UNU Exh. 27A at 14. Requiring a performance bond would place the risk of performance and cost directly on the bond issuer—not on the host community or leaseholder. *Id.* A performance bond would eliminate the need for the Board or Staff to review periodic closure cost estimates, since the bond issuer is obligated to complete decommissioning to the specified scope of work regardless of cost. *Id.* Performance bonds are common in the context of reclamation cost assurance for coal mines, coal processing plants, oil wells, and pit mines. *Id.* Although Mr. Stamberg was not personally aware of a performance bond being required for a wind power project to date (*id.*), there is no

reason why a performance bond requirement should not be considered as Ohio evaluates its own policy for decommissioning cost assurance. The Staff Report indicates that some states do contemplate a performance bond as an appropriate form of financial assurance. Staff Exh. 2 at 52. In fact, even the Applicant's discussion of financial assurance is subtitled, "Performance (Reclamation) Bond." Applic. at 199.

A second alternative for insuring against significant fluctuations in decommissioning cost would be to require a surety bond set at double the estimated decommissioning cost prepared by a Board-approved professional engineer. Stamberg Dir., UNU Exh. 27A at 15. This would provide an adequate buffer against escalating demolition costs or fluctuating scrap values. In Mr. Stamberg's experience, such an approach would not double the cost of the bond. *Id.* If the Applicant provides solid decommissioning cost estimates to the bonding company, the latter would recognize that its financial exposure is likely to be less than the total bond limit. *Id.* Therefore, although the bonding company would likely apply a percentage premium reflecting the risk of higher decommissioning costs, that premium would not double the cost of the bond.

The Applicant's financial assurance proposal contemplates that the bond would be in a form "reasonably acceptable to the landowner." Applic. at 199. The Staff Report, on the other hand, recommends that the "decommissioning funds (financial assurance) shall be payable to the Board and conditioned on the faithful performance of all requirements and conditions" of the approved decommissioning plan. Staff Exh. 2A (emphasis added). Should the Board require a surety bond for a fixed sum (as opposed to a performance bond), making the Board the holder/payee of the bond would assure that decommissioning is completed properly. Stamberg Dir., UNU Exh. 27A at 16.

B. The Board, Not The Applicant, Should Appoint An Independent Professional Engineer To Prepare The Cost Estimates For Decommissioning, Subject To Public Comment On The Engineer's Selection And On The Engineer's Decommissioning Estimates.

Decommissioning cost estimates should be prepared by an independent professional engineer to curb the incentive to skew the cost estimate for the developer's benefit. Mr. Stamberg provided numerous examples of how decommissioning cost estimates can be erroneously skewed. For example, cost estimates are prone to error if they do not account for the cost of reducing the steel, copper, and other recyclable scrap to a condition acceptable to the recycler. Stamberg, Tr. Vol. V 1105. Furthermore, when calculating the scrap value of a wind turbine, it is not sufficient merely to calculate the weight of steel and copper in the turbine and apply a quoted price for raw scrap steel or copper. This is because the scrap recycler's price quote may include specifications for the scrap—for example, that it be delivered to the recycling facility, that steel pieces be cut down to specified sizes, and that copper be stripped from the generating equipment. Stamberg Dir., UNU Exh. 27A at 8-9. If the decommissioning cost estimate does not take into account the volatility of scrap prices and the costs of meeting recycler's specifications, the decommissioning cost estimate may overestimate the scrap value of a turbine and, therefore, underestimate the net decommissioning cost. *Id.*

For this reason, the UNU Intervenors concur with the Staff's recommendation that the decommissioning cost estimate be prepared by an independent professional engineer whose selection is approved by the Board or its Staff. Staff Exh. 2A; *see also* Stamberg, Tr. Vol. V. 1127. Given the importance of the decommissioning plan to the host community, a community representative also should be given the opportunity to review, and provide comments or objections concerning, the selection of the independent engineer. *Id.* The UNU Intervenors

submit that the Champaign County Engineer would be the appropriate community representative for such review and comment. Although Mr. Siegfried of the Staff stated that he was “not opposed” to an opportunity for notice and comment in connection with the selection of a professional engineer (Siegfried, Tr. Vol. VIII 1820), at this time neither the Applicant’s decommissioning plan nor the Staff’s decommissioning proposal provides for review and comment by the County Engineer or another community representative. So that the professional engineer’s decommissioning cost estimates may benefit from information possessed by the public, these estimates should also be subject to public comment.

C. Decommissioning Should Be Required If The Turbines Fall Into Disuse Or Disrepair, And The Applicant Should Be Required To Inform The Board Prior To The Expiration Of Its Bond To Ensure It Does Not Lapse.

The Applicant’s proposed decommissioning plan contemplates that decommissioning would occur “at the termination of the lease.” Applic. at 199. Under such a provision, a turbine (or the entire facility) could be left in a state of disuse or disrepair so long as the underlying lease remains in effect.

The Staff Report, on the other hand, recommends that decommissioning be completed “within (12) twelve months after the end of the useful life of the facility or individual wind turbines.” Staff Exh. 2, Appendix 1. The Staff would deem the facility (or a turbine) to be at the end of its useful life if no electricity is generated for a continuous period of one year or if the facility or turbine is in a state of disrepair warranting decommissioning. *Id.* The Staff’s recommended approach, so far as it goes, is far preferable to that of the Applicant since it would cover disuse of turbines due to malfunction, abandonment, or the bankruptcy of Buckeye Wind.

Mr. Stamberg recommended additional triggers for decommissioning in his direct testimony. Stamberg Dir., UNU Exh. 27A at 12. At a minimum, the Board should consider Mr.

Stamberg's comments concerning the potential lapse of the decommissioning bond. A bond will be of little use to the State or the host community if it is allowed to lapse before decommissioning can be completed. Therefore, well in advance of the date of termination of the bond, the Applicant should be required to demonstrate to the Board that it has obtained from a bonding company an enforceable commitment for renewal or replacement of the bond—or, in the alternative, the Applicant should be required to commence and complete decommissioning prior to expiration of the current bond. In order to ensure that decommissioning is completed before lapse of the bond, the notice of renewal should be required sufficiently in advance of the lapse of the bond to permit communications between the Board and the Applicant, completion of the decommissioning work, inspection by the Staff, and completion of any follow-up corrective measures.

D. The Board Should Require Financial Assurance And Decommissioning Cost Estimates Prior To Construction.

Financial assurance for decommissioning should be required for the entire life of the project, beginning from commencement of construction. The Staff Report notes that some, but not all, other states require financial assurance at the outset of construction. Staff Exh. 2 at 53. But to only require financial assurance after one year of facility operation (Staff Exh. 2A)—or, worse yet, after five years of operation (Applic. at 199)—would leave open the possibility that Buckeye Wind may go defunct before financial assurance is in place. Such a scenario is not inconceivable, since the proposed facility will constitute the entirety of the assets of Buckeye Wind, LLC, *see* Applic. at 70 (present worth and annualized capital costs), and the renewable energy market in Ohio is new and largely untested. It is folly to assume (as did Mr. Doss of the Staff) that Buckeye Wind is financially stable merely because it proposes to build 70 turbines at \$3.4 million apiece. Doss, Tr. Vol. IX 2106-2107. The existence of vast investments in energy

infrastructure did not prevent Enron from collapsing. It should be further noted that Mr. Doss had no notion when the risk of project abandonment would first arise during the life of the project (*id.* at 2099), nor did he have an opinion whether it was good public policy to defer financial assurance until one year after project construction (*id.* at 2101). Mr. Doss simply based his recommendation on his unsupported impression that requiring Buckeye Wind to provide financial assurance from the start of construction would cause “undue financial hardship” to the company. *Id.* at 2097.

Though the Applicant claims that equipment warranties, insurance, or potential equipment resale value will cover the cost of decommissioning in the first few years of operation, none of those options can be relied on directly by the State in the event Buckeye Wind does not complete decommissioning before financial assurance is required. The only way to ensure the enforcement of decommissioning conditions is through a financial assurance mechanism naming the State (or Champaign County) as a beneficiary. After all, Buckeye Wind intends to reap the financial rewards of the proposed Project. The State and the host community should not be expected to bear its risks.

E. Buckeye Wind Should Provide Financial Assurance For Repairing Damaged Roads And Bridges.

The preceding discussion relates to decommissioning of the Buckeye Wind facility itself. Neither the Staff Report nor the Application addresses how Buckeye Wind will compensate Champaign County or its townships for damage to roadways or other infrastructure during facility construction. Leon Cyr, a County Commissioner for Benton County, Indiana, testified that his county has experienced delays and other difficulties in requiring wind developers to repair road damage resulting from passage of heavy equipment during facility construction. In fact, Mr. Cyr testified that the County enacted an ordinance requiring developers to post bond for

road repairs, and that the county has threatened to use the bond(s) due to delays in repairs. Cyr, Rebuttal Tr. Vol. II 2472. Mr. Cyr also recommended that the decommissioning plan provide for a similar bond for repairing road damage incurred in the course of decommissioning. *Id.* at 2473.

The issue of road repairs is a concern that should be adequately addressed in any certificate that may be issued for the Buckeye Wind Project. The UNU Intervenors anticipate that Champaign County will address this issue fully in its initial brief.

VII. THE BOARD SHOULD RECONSIDER A NUMBER OF ITS RULINGS ON MOTIONS AND EVIDENTIARY ISSUES.

Over the last nine months, this case has presented the ALJs with a flood of motions and objections, both procedural and evidentiary. Some of them presented novel issues that were thus strongly contested by the parties. The UNU Intervenors respectfully submit that several of the outcomes of motions and objections relating to site alternatives waivers, the admissibility of evidence, and the relevance of cross-examination were wrongly decided and prejudicial to the UNU Intervenors. For the following reasons, the UNU Intervenors request reconsideration of the following rulings:

A. The Board Should Not Have Waived The Site Alternative Analysis Requirements.

For the reasons set forth in the UNU Intervenors' Memorandum Contra Motion for Waiver filed in this case on May 8, 2009, it was error for the ALJ to grant Buckeye Wind's requested waiver of the site alternative analysis requirements of O.A.C. § 4906-13-03. The UNU Intervenors will not restate those arguments in this brief, but incorporate them by reference herein.

In addition, and for the same reasons, UNU Intervenors further object to the ALJ's additional waiver of the parallel site alternative analysis requirements in O.A.C. § 4906-17-04. In addition, UNU Intervenors strenuously object to the ALJ's waiver of the site alternatives analysis requirements of Chapter 4906-17 insofar as these requirements were not included in the Applicant's Motion for Waiver, which was limited to O.A.C. Chapter 4906-13. Board Rule 4906-1-03 provides that the Board or ALJ may, for good cause shown, as supported by a motion and supporting memorandum, waive any requirement, standard, or rule of the Board. Rule 4906-1-03 does not authorize the ALJ to waive requirements *sua sponte*.

Furthermore, while the Board or ALJ may waive requirements under the Board's rules, such waiver authority does not extend to waiver of statutory requirements. In effect, that is what the ALJ's waiver ruling has done in this case. By granting "a waiver of the submission of alternative site information in this matter pursuant to rules in Chapter 13 (or corresponding rules in Chapter 17)," Order, 7/31/09, at 12, the ALJ has in essence released Buckeye Wind from its statutory burden of proof to demonstrate that its proposed facility "represents the minimum adverse environmental impact, considering the state of available technology and the nature and economics of the various alternatives, and other pertinent considerations." R.C. § 4906.10(A)(3) (emphasis added). Neither the ALJ nor the Board can waive such requirement. Furthermore, the waiver in question has deprived the Board of evidence of site alternatives necessary for it to determine whether the criteria of § 4906.10(A)(3) have been met.

B. Intervenors Have Standing To Oppose Waiver Requests.

In connection with her ruling on the Applicant's Motion for Waivers, the ALJ also ruled erroneously that the UNU Intervenors lacked standing to challenge the waiver motion. The ALJ accepted Buckeye Wind's argument that the requested waivers were similar to waivers of the PUCO's Standard Filing Requirements (SFRs), which PUCO intervenors do not have standing to

challenge. Entry, 7/31/09, at 8-9. The ALJ reasoned that “the purpose of the Board’s certification application requirements, like the PUCO’s SFRs, is to obtain sufficient information to enable the Staff to fulfill its statutory duty to conduct an investigation and file its report of investigation.” *Id.*

But certainly an intervenor has standing to oppose waivers of Power Siting Board rules to the extent that those waivers have the potential to bar the intervenor from conducting discovery and cross-examination on issues relevant to the certification criteria of R.C. § 4906.10. Basic to the establishment of standing is that the challenged action has caused, or will cause, the party injury in fact and that the interest sought to be protected is within the realm of interests regulated or protected by the law in question. *State ex rel. Dayton Newspapers, Inc. v. Phillips*, 46 Ohio St.2d 457 (1976); *Franklin County Reg. Solid Waste Mgt. Auth. v. Schregardus*, 84 Ohio App.3d 591, 599 (10th App. Dist. 1992). *See also Sierra Club v. Morton*, 405 U.S. 727, 731 (1972) (“standing to sue” means a party has a sufficient stake in an otherwise justiciable controversy to obtain resolution of that controversy). And while the ALJ held in her waiver ruling that the UNU Intervenors would not be precluded from cross-examination on the basis of the waivers, unfortunately that has indeed been the practical result in this case. *See infra* at 102.

The practical effect of waiving the site alternative analysis requirements has not been limited to whether the Staff had sufficient information to complete a report of investigation. As explained above, it had the effect of releasing the Applicant from its statutory burden of proof under R.C. § 4906.10(A)(2) and unlawfully shifting the burden of proof to the intervenors to prove the existence of viable alternative sites. *See supra* at 100. Such a waiver also incorrectly created an impression that site alternatives are no longer relevant to the proceedings, thereby

leading to evidentiary rulings at the hearing that foreclosed cross-examination on the basis of relevance. *Infra* at 102.

Because an intervenor has standing to oppose a waiver that has the effect of unlawfully shifting the burden of proof and foreclosing the intervenors' right to cross-examination, the ALJ erred in ruling that the UNU Intervenors lacked standing to oppose Buckeye Wind's waiver requests. The UNU Intervenors acknowledge that the ALJ considered their arguments in opposition to the waiver requests despite her ruling on standing. Order, July 31, 2009, at 8-9. Nonetheless, it is necessary to request reconsideration of her ruling on standing because that ruling may prejudice the UNU Intervenors' ability to challenge other aspects of the waivers on rehearing or appeal.

C. The UNU Intervenors Had The Right To Cross-Examine The Applicant's Representative Concerning Siting Alternatives.

As mentioned above, the waiver of the Board's site alternatives requirements in this case led to ALJ rulings that site alternatives were irrelevant and out-of-bounds for cross-examination. On November 9, 2009, the ALJ sustained a relevance objection to the following question posed to Christopher Shears concerning Everpower's siting criteria. The questioning, objection, and ensuing exchange proceeded as follows:

MR. WALKER. All right. I'd like to ask you some general questions now about your evaluation of sites for a wind farm project. Did you consider any sites for this project that had a lower population density than the current proposed project area?

A. As is set out in the application on the pages you flagged, 21, broadly 20 onwards, that sets out our criteria, so we did not specifically assess other areas. We did assess this area and looked at what we felt were appropriate setbacks and all of the other issues that we've set out in here and felt this was an appropriate location.

Q. So am I safe to assume also that you did not consider other areas that had a lower or higher power density than the Buckeye Wind area?

A. Power density. You mean wind resource.

Q. And the ability to put more or fewer turbines in a specific area.

A. I'm not sure I follow. We believe this is one of the very best wind resource areas in Ohio and that's one of the reasons why we are located in this area

* * *

Q. . . . Isn't it true that the highest wind resources in Ohio are off shore in Lake Erie?

A. I'd say that is probably true.

Q. . . . Why haven't you considered siting this project out there?

MR. PETRICOFF: Objection; relevance. The application has nothing to do with Lake Erie.

ALJ STENMAN: Do you have a response?

MR. WALKER: Yes. These proceedings have everything to do with siting and we believe that the alternative locations for this project would [correction "should"] take into account population density, impacts on residents, as well as the potential for electrical generation. Those issues are perfectly appropriate to explore in these proceedings.

MR. PETRICOFF: No, your Honor, they are not. The purpose of this hearing is for this application, whether the merits of this application meet the eight criteria of the Board. The fact that there may be a better site in Montana or a better site in Lake Erie or a better site anywhere than in my backyard is irrelevant. The only thing that's relevant is this application and this site.

* * *

ALJ STENMAN: Give us a moment. Objection sustained. You can go ahead.

Shears, Tr. Vol. I 100-102 (emphasis added). Shortly thereafter, similar questioning of Mr.

Shears was also barred on the grounds of relevance:

MR. WALKER. Are you developing or are you obtaining wind power leases for other areas in Champaign County outside the project area?

A. We do have some additional lease positions, yes.

Q. In what geographic areas are you looking?

MR. PETRICOFF: Your Honor, I want to object at this point because this sounds like we're now asking for something that may be confidential and proprietary business information because of the route that they're out looking for leases at the moment or having leases at the moment; that is something we would not want to put out in a public forum.

ALJ STENMAN: Do you have a response?

MR. WALKER: My only response is I believe that it's a proper question and we're entitled to an answer. If your Honors believe that it should be information provided under seal, we would have no objection to that.

ALJ STENMAN: We are going to sustain the objection and also—sustain the objection as it relates to the question in general. We're only considering the application in the present case, so let's move on.

Tr. Vol. I 106 (emphasis added). These evidentiary rulings illustrate the prejudicial effect of the site alternative waivers, because the ALJs premised their rulings on the premise that the waiver made irrelevant the inquiries about alternative sites. Although the waiver ruling stated that intervenors would not be precluded from cross-examination on the basis of the waivers, the ALJs nevertheless premised their evidentiary rulings on that basis. Moreover, waiver or not, information about potential alternative sites suitable for turbines, whether located near or far from the Project area, is relevant, and the UNU Intervenors should have been allowed to inquire into this topic. Mr. Petricoff aptly highlighted the error by asserting, “The only thing that’s relevant is this application and this site.” Tr. Vol. I 101.

Questions about site alternatives or application of siting criteria are relevant to R.C. § 4906.10(A)(3), which requires the Board to consider “the nature and economics of the various alternatives.” In fact, in her ruling on the UNU Intervenors’ Motion to Compel Discovery, the ALJ ruled that the issue of Buckeye Wind’s alternative siting considerations was subject to discovery. Order, October 31, 2009, at 4. Therefore, the UNU Intervenors should have been permitted to question Buckeye Wind’s representative about the Applicant’s consideration of other potential project locations, e.g., locations that might have a higher wind potential or lower population density and associated impacts such as noise. Among other things, these rulings prevented the UNU Intervenors from inquiring into potential turbine sites that could be substituted for proposed turbine sites that threaten nearby neighbors with harmful noise, shadow flicker, and other impacts. The ALJ erred in sustaining relevance objections to such questioning.

D. The Board Should Have Allowed The UNU Intervenors To Introduce The Testimony Of Dr. Michael Nissenbaum By Deposition, And His Affidavit Should Have Been Admitted Into Evidence.

According to the Staff Report, the Ohio Department of Health, “citing a lack of hard scientific evidence on potential health impacts associated with utility scale wind projects, . . . has suggested that a setback from non-consenting residents greater than that included in 4906-17, O.A.C., may be warranted.” Staff Exh. 2 at 38. The Staff noted further that it expected this topic to be “addressed extensively during the public and evidentiary hearing.”

To this end, the UNU Intervenors sought to present the testimony of Dr. Michael Nissenbaum, a practicing physician with the Northern Maine Medical Center in Fort Kent, Maine, who would testify about the health impacts caused by wind turbine noise based in part on his study of an operating wind farm in Maine. Due to Dr. Nissenbaum’s medical duties with a rural hospital, he was unable to travel to Ohio to testify at the evidentiary hearing and informed

UNU Intervenors' counsel that he could not and would not travel to Ohio to testify.

Accordingly, the UNU Intervenors filed a motion requesting an order establishing their right to introduce Dr. Nissenbaum's deposition as evidence in lieu of live testimony before the ALJs at hearing. Motion of Intervenors Union Neighbors United, Inc., Diane and Robert McConnell, and Julia F. Johnson for Ruling on Admissibility of Deposition of Dr. Michael Nissenbaum (10/13/09). The ALJ denied the motion on October 22, 2009, holding that "it is unreasonable to admit the deposition of Dr. Nissenbaum in lieu of live testimony at the hearing." At the conclusion of their case-in-chief at the evidentiary hearing, the UNU Intervenors proffered the written direct testimony of Dr. Nissenbaum in order to make a record of the nature of his testimony had his deposition been admitted into evidence. Tr. Vol. VII 1631-34; UNU Exh. 68.

For the reasons set forth in the UNU Intervenors' Motion for Ruling on Admissibility of Deposition of Dr. Nissenbaum, which is incorporated herein, the UNU Intervenors submit that the exclusion of Dr. Nissenbaum's deposition as testimony was in error and request reconsideration of that issue. The UNU Intervenors further request that the evidentiary hearing be reopened for the purpose of admitting Dr. Nissenbaum's deposition transcript as testimony in this case.

At the public hearing in this matter held on October 28, 2009, Ms. Glenda Rodriguez, a member of UNU, asked to "offer the affidavit of Dr. Michael Nissenbaum as it deals with health issues I'm concerned about for my family." Public Hearing Tr. 40. Ms. Rodriguez' request was consistent with the following procedural instructions of the ALJ given at the outset of the hearing:

If you have a statement that you want to have put in the record on behalf of someone else, I can take your written statement and it will be included in the Commission's docket in this proceeding.

Id. 8. The ALJ took Ms. Rodriguez' request under advisement to be addressed later as part of the adjudicatory proceedings. *Id.* 41. On Day 7 of the evidentiary hearing (November 18, 2009), the ALJ ruled that Dr. Nissenbaum's statement would be included as correspondence in the docket but would not be part of the record of witnesses who were available to be cross-examined in this case. Tr. Vol. VII 1638.

If the effect of inclusion on the docket as correspondence is to permit the Board to consider Dr. Nissenbaum's affidavit as evidence, the UNU Intervenors have no objection to the ALJ's ruling. If, on the other hand, Dr. Nissenbaum's affidavit will not be treated as evidence, the UNU Intervenors submit that this ruling is in error and request reconsideration of the matter for the reasons set forth in their November 11, 2009 Memorandum in Opposition to Motion to Exclude Testimony Presented at Public Hearing, which motion is incorporated herein.

E. The Board Should Allow Discovery Of The Drafts And Preliminary Versions Of Buckeye Wind's Application.

In the ALJ's entry of October 30, 2009, the ALJ denied the UNU Intervenors' request for an order to compel Buckeye Wind's production of drafts and preliminary versions of the Application (document request 10). As stated in the UNU Intervenors' Motion to Compel, which is hereby incorporated by reference, these documents may have provided or led to the discovery of useful, relevant information. For example, these documents may have contained statements inconsistent with the Application's statements concerning the impacts of the turbines' noise on the Project's neighbors. Therefore, the Board should remand this Application to conduct discovery on these records, and reopen the hearing to the extent necessary to introduce any probative evidence from these records.

F. Because Christopher Shears Was Not Qualified As An Expert And Lacked Knowledge On A Wide Range Of Issues On Which He Provided Opinion Testimony, That Testimony Should Have Been Stricken, And He Should Not Have Been Permitted To “Sponsor” Portions Of The Application For Which He Was Not Qualified As An Expert.

After Christopher Shears’ testimony on November 10, 2009, Applicant’s counsel moved into evidence Applicant Exhibits 1, 1A, 2, 3, 4, and 4A. Tr. Vol. II 363. At that time, counsel for the UNU Intervenors moved to strike portions of Applicant Exhibit 4, the written direct testimony of Mr. Shears, on the grounds that Mr. Shears was not qualified as an expert to render opinions on a number of subjects addressed in his direct testimony. *Id.*

According to Mr. Shears’ testimony, he has a degree in Countryside Management, the precise subject matter of which was not established on the record. Shears Dir., Applicant Exh. 4 at 2. Nonetheless, in his direct testimony Mr. Shears ventured opinions on a broad range of subjects for which he was not qualified as an expert and/or for which no foundation was provided to demonstrate that he possessed the knowledge necessary to testify about them. For these reasons, counsel for the UNU Intervenors moved to strike the following portions of Applicant Exhibit 4:

- 1) *Opinions regarding air pollutants that would be offset by the Buckeye Wind Project (Shears Dir., Applicant Exh. 4, top of p. 4 to top of p. 7).* As discussed in Section III. A. 1. above, Mr. Shears was not qualified as an expert on air pollution control or the estimation of air emissions. He testified that he did not personally calculate the pollution offsets claimed by Buckeye Wind in the Application and in his testimony, but that those calculations were prepared by a consultant of Buckeye Wind. Shears, Tr. Vol. I 31. Mr. Shears could not testify

regarding the basis for the emission factors upon which the offset claims were based. Although Mr. Shears testified that the claimed emissions offsets were based on an emission factor, he could not specify what that emission factor was or how it was derived. Shears, Tr. Vol. I 32. For those reasons, counsel for the UNU Intervenors moved to strike Mr. Shears' direct testimony from the last two lines of page 4 to the answer to Q. 14 at the top of page 7. Tr. Vol. II 363-64.

b) *Opinions regarding job creation resulting from the Project (Shears Dir., Applicant Exh. 4 at 8, first paragraph)*: Mr. Shears offered opinions as to the economic benefits, particularly job generation, that the Project would bring to the host community and the surrounding region. The primary source of those claims is a report of Buckeye Wind's consultant, Saratoga Associates, which was included in the Application as Exhibit R. Mr. Shears did not personally prepare Exhibit R, was not qualified as an expert in economics or socioeconomics, and was unaware of the basis for key claims in the Saratoga Associates report. Shears, Tr. Vol. I 54-55. He did not know the basis for the job creation estimates on page 55 of Exhibit R (Shears, Tr. Vol. I 55), did not know how many construction workers would be employed locally (*id.* at 56), and had no understanding of the basis for the multipliers used to derive the employment predictions in Exhibit R (*id.* at 57). For these reasons, the UNU Intervenors moved to strike the first paragraph of page 8 of Mr. Shears' direct testimony. Tr. Vol. II 366.

c) *Opinions concerning noise from the Project (Shears Dir., Applicant Exh. 4 at 12)*: Mr. Shears was not qualified as an expert on wind turbine noise, yet he states at page 12 of his testimony:

Mr. Hessler has prepared a Noise Impact Assessment' and has helped design a project that employs rigorous standards for sound levels at nearby residents. We strongly believe that the project is designed with prudence and complaints associated with noise will be minimal.

The UNU Intervenors moved to strike that paragraph. *Id.*

d) *Opinions concerning lack of impact on property values (Shears Dir., Applicant Exh. 4 at 12)*: Although Mr. Shears was not qualified as an expert on property appraisal or real estate market principles, he offered the following opinions at page 12 of his testimony:

The topic of property values is very sensitive as the idea that home values can drop precipitously can cause high levels of fear and anxiety. There are many factors that contribute to the value of a home or of property, and it is very difficult to isolate the contribution of one particular factor. There have been a number of attempts to analyze the impact of wind turbines on property value, and results from appropriately conducted real estate research have shown an absence of measureable effects of wind farm visibility on property transaction values.

The UNU intervenors moved to strike that paragraph. *Id.*

e) *Opinions concerning shadow flicker (Shears Dir., Applicant Exh. 4 at 13)*:

Mr. Shears devotes the entirety of page 13 to the topic of shadow flicker.

Because Mr. Shears was not qualified as an expert on shadow flicker for purposes of the hearing, and did not prepare the shadow flicker study attached to the Application (Applic. Exh. L), the UNU Intervenors moved to strike his testimony

on page 13. Tr. Vol. II 367. On further consideration, however, the UNU

Intervenors now believe only the following portion of page 13 should be stricken:

The design goal of limiting the potential for shadow flicker to 30 hours per year is a reasonable limit and I believe will result in very few, if any, complaints. The model uses conservative assumptions so that the modeled result would error on the side of over-predicting the impact. Factors such as the blocking effect of buildings and trees (landscaping and individual trees are not inputted in the model), the assumed presence of humans at all times when flicker would occur (the majority of the time shadows would be cast on homes are in daylight morning or evening hours, and in the winter) and omni-direction modeling (shadow flicker impacts are accounted for all sides of a receptor building, with no consideration for location of windows and orientation of more highly used rooms).

f) *Opinions regarding ice shedding from wind turbines (Shears Dir., Applicant*

Exh. 4 at 14-15): Since Mr. Shears was not qualified as an expert on ice

shedding, the UNU Intervenors moved to strike the following statements on pages

14-15 of his direct testimony:

Field observations and studies of ice shedding most shedding occurs as air temperatures rise, therefore, the tendency is that ice fragments drop off the rotors and land near the base of the towers. Ice throw is less common, and there has been no reported injury caused by ice being thrown from an operating wind turbine. Studies by Garrad Hassan indicate that there is negligible risk at distances beyond about 220 meters (722 feet).

Data gathered by the European Union Wind Energy in Cold Climates research collaborative shows that ice fragments typically land within about 100 meters (328 feet) of a turbine. Given these findings, I believe that the a minimum setback of 914 feet to residences and 590 feet from property lines, employing standard safety measures, should be adequate to protect the public from falling ice.

Tr. Vol. II 367.

g) *Opinions concerning health issues associated with wind turbines (Shears Dir., Applicant Exh. 4 at 15)*: On page 15 of his direct testimony, Mr. Shears made the following statement:

As Dr. Mundt will testify, there is no credible scientific evidence for the concerns regarding adverse health effects due to sound, shadow flicker or other impacts associated with wind turbines. I believe the Buckeye Wind Project has been designed in a prudent and responsible way to minimize any potential effect.

Since Mr. Shears was not qualified as a health expert, the UNU Intervenors moved to strike the above statement. Tr. Vol. II 367.

h) *Opinions regarding Project impacts on Indiana Bats (Shears Dir., Applicant Exh. 4 at 17)*: Finally, in his answer to Q. 23 on page 17, Mr. Shears offered various opinions concerning methods for mitigating harm to Indiana bats and the merits of the Buckeye Wind Project design for minimizing or avoiding such harm. Because Mr. Shears was not qualified as a bat expert, the UNU Intervenors moved to strike all but the first sentence in his response to Q. 23. Tr. Vol. II 368.

For the same reasons, counsel for Champaign County and the Townships moved to strike the following portions of the Application for lack of foundation, or to have their admission into evidence deferred until the Applicant could properly present them by expert testimony:

- Exhibit K, Noise Impact Assessment
- Exhibit L, Turbine Safety Manual
- Exhibit M, Surface Water, Ecological Communities, and Threatened and Endangered Species
- Exhibit N, 2007 Avian Bat Study
- Exhibit O, 2008 Avian Bat Study
- Exhibit R, Socioeconomic Report
- Exhibit T, Facts about Ohio Taxes

- Exhibit U, Cultural Resources Report
- Exhibit V, Communication Studies
- Exhibit W, Route Evaluation Study
- Exhibit X, Summer 2008 Mist-Netting Report

Tr. Vol. II 370. The UNU Intervenors joined in the County and Township Intervenors' motion to strike.

The ALJ denied the County and Township Intervenors' motions to strike, reasoning that the documents in question were part of an Application which has been determined by the Board to be complete. *Id.* 373. She further noted, "Each of the intervenors has an opportunity to challenge or to question that information and present a different position on those factors." *Id.* In a similar fashion, the ALJ denied the UNU Intervenors' motion to strike, stating, "Each of the intervenors has an opportunity to question and challenge the position of the company on the issues or the opinions of Mr. Shears." *Id.* 373-74. The testimony and Application exhibits in question were admitted into evidence. *Id.* 374.

The UNU Intervenors respectfully submit that it was error to admit into evidence the testimony and exhibits at issue in the motion to strike. None of the testimony and exhibits in question was presented by a witness with knowledge at the time they were admitted into evidence. They were only "sponsored" by Mr. Shears, who was not an expert on any of the topics at issue and plainly admitted a lack of knowledge concerning some of them. Given his lack of knowledge and expertise on those subjects, such an arrangement did not afford the intervenors "an opportunity to challenge or to question that information," as suggested by the ALJ. Tr. Vol. II 364. In fact, admitting Application exhibits into evidence without supporting testimony from a live witness with knowledge is contrary to the reasoning that led to the exclusion of Dr. Nissenbaum's affidavit from the record. This has created an evidentiary double

standard, whereby the Applicant is permitted to put information into evidence without a supporting witness with knowledge, but the intervenors are required to present live witnesses. In effect, this situation has unlawfully shifted the burden of proof from the Applicant to the intervenors. The Applicant was not required to present witnesses with knowledge for cross-examination, placing on the intervenors the burden to find their own witnesses and evidence to disprove claims that the Applicant was never required to establish through live testimony.

For all of the above reasons, the UNU Intervenors request reconsideration of the motions to strike concerning Mr. Shears' direct testimony and the unsupported Application exhibits. The specified portions of Mr. Shears' testimony should be stricken from the record, as should Application Exhibits K, L, M, N, O, R, T, U, V, W, and X to the extent that they were not supported by a live expert witness with knowledge.

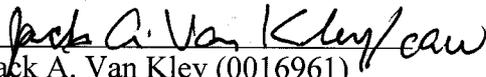
VIII. CONCLUSION

For the above reasons, the Buckeye Wind Project, as proposed in the Application, does not represent the minimum environmental adverse environmental impact, considering the state of available technology and the nature and economics of the various alternatives. Furthermore, in light of its considerable adverse impacts on the host communities of Champaign County, the Project as proposed does not serve the public interest, convenience, and necessity. For these reasons, the Application should be denied.

In the alternative, the UNU Intervenors request that the Board grant reconsideration of the various procedural and evidentiary rulings in accordance with Section VII of this brief, and remand this matter for further proceedings in accordance with said reconsideration.

If the Board decides to issue a Certificate for the Buckeye Wind Project, the UNU Intervenors request that the Board include all of the mitigating setbacks, measures, and conditions recommended in this brief.

Respectfully submitted,


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CERTIFICATE OF SERVICE

I hereby certify that, on January 20, 2010, a copy of the foregoing Opening Post-Hearing

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**BEFORE
THE OHIO POWER SITING BOARD**

**In the Matter of the Application of)
Buckeye Wind LLC for a Certificate)
to Install Numerous Electricity)
Generating Wind Turbines in)
Champaign County to be Collected at)
an Electrical Substation in)
Union Township,)
Champaign County, Ohio)**

Case No. 08-666-EL-BGN

**POST-HEARING REPLY BRIEF OF INTERVENORS
UNION NEIGHBORS UNITED, INC., ROBERT AND
DIANE MCCONNELL, AND JULIA F. JOHNSON**

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TABLE OF CONTENTS

I. INTRODUCTION.....1

II. BUCKEYE WIND HAS FAILED TO MEET ITS BURDEN TO PROVE THAT IT IS ELIGIBLE FOR A POWER SITING CERTIFICATE UNDER R.C. § 4906.10(A)2

A. In Addition To The Other Gaps And Flaws In Buckeye Wind’s Evidence Concerning The Public Benefits Of The Project, The Governor’s Initiative To Eliminate The Utility Personal Property Tax For Wind Power Shows That The Economic Benefits Of The Project Are Far From Certain4

B. The Noise From The Buckeye Wind Project As Proposed Will Cause Serious Discomfort, Sleep Deprivation, And Health Problems6

1. The Applicant Has Not Produced Any Credible Evidence That It Is Unable To Redesign The Project In A Manner That Preserves Its Profitability While Protecting The Health And Comfort Of Nonparticipating Neighbors.....6

2. The Project Is Not Designed To Prevent Noise Impacts Widely Regarded By The Acoustical Engineering And Medical Fields As Threats To The Public’s Health And Comfort.....7

3. Buckeye Wind’s Predictions Of Turbine Noise Levels Are Anything But “Conservative”18

4. The Board’s Prior Decisions On Dissimilar Facilities And The Staff’s Position In The Instant Case Provide No Meaningful Guidance For Controlling Wind Project Noise18

5. The Certificate Needs To Have An Enforceable Noise Limit That Provides Clarity On The Standard To Be Met27

6. The Complaint Resolution Procedure Should Be Modified To Make It Meaningful.....29

C. Shadow Flicker Is Indisputably A Nuisance Impact Of The Project That Warrants Effective Mitigation.....31

D. The 500-Foot Minimum Setback Recommended By Staff Has Been Proven At Hearing To Be Inadequate To Protect Neighboring Properties From The Hazards of Blade Shear And Ice Throw32

E.	The Applicant’s Plans To Obtain An Incidental Take Permit Confirm The Project’s Damage To The Indiana Bats In The Project Area, So The Board Needs To Take Actions Necessary To Protect The Bats And Their Habitat..	35
F.	The Evidence Demonstrates That The Project Will Have An Adverse Effect On Aviation.....	36
G.	The Weight of Evidence Demonstrates That the Project Will Adversely Affect Property Values	38
III.	ADDITIONAL PROTECTIONS ARE NECESSARY TO ENSURE ADEQUATE DECOMMISSIONING OF TURBINES.....	41
IV.	CONDITIONS ALLOWING POST-CERTIFICATE ALTERATIONS, INFORMATION SUBMISSION, AND SIMILAR MEASURES WOULD UNFAIRLY UNDERMINE THE PURPOSE OF THE EVIDENTIARY HEARING AND RELIEVE BUCKEYE WIND OF ITS BURDEN OF PROOF.....	43
V.	CONCLUSION	46
•	CERTIFICATE OF SERVICE 51 The conditions in the Certificate should contain the revisions and additions to its decommissioning requirements described on pages 91-98 of the UNU Intervenors’ opening brief.	

TABLE OF AUTHORITIES

CASES

Ohio:

Diversified Mortg. Investors, Inc. v. Athens County Bd. of Revision,
7 Ohio App.3d 157 (4th Dist. 1982)21

Erdeljohn v. Ohio St. Bd. of Pharmacy, 38 Ohio Misc.2d 1 (Hamilton Cty. 1987)3

Haley v. Ohio St. Dental Bd.,7 Ohio App.3d 1 (1982)3

Masheter v. C. H. Hooker Trucking Co., 19 Ohio App.2d 169 (5th App. Dist. 1969).....39

NorthPoint Properties, Inc. v. Petticord, 179 Ohio App.3d 342 (8th Dist. 2008).....20

Orange City School Bd. of Ed. v. Cuyahoga Cty. Bd. of Revision,
74 Ohio St.3d 415 (1996)2

Sinclair v. Sinclair, 182 Ohio App.3d 691 (4th Dist. 2009)21

Administrative:

In re American Municipal Power-Ohio, Inc., Case No. 06-1358-EL-BGN,
Opinion, Order, and Certificate, Mar. 3, 2008.....19, 30, 38

In re American Municipal Power-Ohio, Inc., Case No. 06-1358-EL-BGN,
Entry on Rehearing, April 28, 2008.....2, 3

In re Aquila Fulton County Power, LLC, Case No. 01-1022-EL-BGN,
Opinion, Order, and Certificate, May 20, 200219, 22

In re Columbus Southern Power Co., OPSB No. 06-0030-EL-BGN
Opinion, Order, and Certificate, April 23, 200737, 38

In re Duke Energy Hanging Rock, LLC, Case No. 01-175-EL-BGN,
Opinion, Order and Certificate, Sept. 17, 200121

In re Fremont Energy Center, LLC, Case No. 00-1527-EL-BGN,
Opinion, Order, and Certificate, May 21, 200128

In re PG&E Dispersed Generating Co., Case No. 00-922-EL-BGN,
Opinion and Order, Feb. 12, 200119, 21, 28

STATUTES

R.C. § 4961.3237

R.C. § 4561.34137

R.C. § 4906.102, 37, 38, 45

RULES

O.A.C. § 4906-7-092

I. INTRODUCTION

Buckeye Wind opens its brief with the bold claim that it has “presented a Facility designed in accordance with good industry practice and intended to minimize adverse impacts.” Applicant’s Brief at 2. Quite to the contrary, the Buckeye Wind Project (“Project”) has not been designed in accordance with good industry practices. In fact, Buckeye Wind ignored the setback recommendations of its preferred turbine manufacturer, Nordex, and other “safe distance” standards that are based on recognized industry practices. *E.g.*, UNU Exh. 11, 13. Nor is the Project designed to minimize adverse impacts. As discussed in the UNU Intervenors’ Opening Brief, the noise modeling supporting Buckeye Wind’s proposed setbacks is badly flawed. Even where Buckeye Wind proposes noise and shadow flicker “design goals” to avoid what it admits are unacceptable impacts on neighboring properties, it then ignores those design goals in siting its turbines. In fact, although the Application claims to strike “a sensible balance between the interests of all parties” that allows viable wind projects to be sited while avoiding noise “so loud that it leads to legitimate disturbance at a large number of homes” (Applic. at 93), Buckeye Wind has sited its turbines so densely as to subject more than 1,000 homes to wind turbine noise in excess of Buckeye Wind’s own design goal. UNU Exh. 43 at 5, Int. 12; Hessler, Tr. Vol. III 855-56. These are hardly “good industry practices.” Rather, Buckeye Wind seeks to cram as many wind turbines as possible into the rural residential communities of eastern Champaign County.

Buckeye Wind also disparages the involvement of the UNU Intervenors as the efforts of a “vocal . . . small citizen group” whose goal is “to keep the Facility out of Champaign County.” Applicant’s Opening Brief at 2. While Buckeye Wind understandably seeks to divert attention from the serious problems with its Project, the UNU Intervenors’ involvement in this case has

been reasonable and has contributed compelling evidence concerning the errors and flaws in the Application and the impacts of the Project. Despite Buckeye Wind's dismissal of the UNU Intervenors as a "small citizen group," neither Buckeye Wind nor the Board can ignore the outpouring of community concern about the Project, as reflected in the transcript of the public hearing and in the docket of this case. As Buckeye Wind itself acknowledged, half of the four hours of testimony at the August 28, 2009 public hearing was in opposition to the Project. Applicant's Opening Brief at 6. Since Buckeye Wind revealed the proposed locations of its turbines, the majority of public opinion has swung against the Project. Johnson, Tr. Vol. V 1189. To lightly dismiss the level of community concern about this Project shows inexcusable arrogance on the part of Buckeye Wind.

II. BUCKEYE WIND HAS FAILED TO MEET ITS BURDEN TO PROVE THAT IT IS ELIGIBLE FOR A POWER SITING CERTIFICATE UNDER R.C. § 4906.10(A).

Buckeye Wind's responsibility in this hearing is more than merely to "defend its application." Staff Opening Brief at 9. Buckeye Wind, by its own admission, has the burden of proof to demonstrate that its Project meets all of the criteria of R.C. § 4906.10(A). Applicant's Opening Brief at 3. Although Buckeye Wind claims it has done so (*id.*), its case was based largely on information in its Application that was not supported at hearing by the testimony of a live witness with knowledge or expertise. UNU Intervenors' Opening Brief at VII(F).

Admittedly, administrative agencies are not generally bound by the Ohio Rules of Evidence. *Orange City School Bd. of Ed. v. Cuyahoga Cty. Bd. of Revision*, 74 Ohio St.3d 415, 417 (1996). The Board has specifically ruled that O.A.C. § 4906-7-09 authorizes hearing examiners to admit evidence that would otherwise be inadmissible under a strict reading of the Rules of Evidence. *In re American Municipal Power-Ohio, Inc.*, Case No. 06-1358-EL-BGN,

Entry on Rehearing, April 28, 2008. Nonetheless, although the hearsay rule may be relaxed in Board proceedings, the discretion of an agency to consider hearsay cannot be exercised arbitrarily. *Haley v. Ohio St. Dental Bd.*, 7 Ohio App.3d 1 (1982); *Erdeljohn v. Ohio St. Bd. of Pharmacy*, 38 Ohio Misc.2d 1 (Hamilton Cty. 1987).

Much of Buckeye Wind's case is based entirely on hearsay evidence in the Application. This includes its assertions on environmental benefits and impacts, aesthetic impacts, shadow flicker, blade throw, ice shedding, and socioeconomic benefits (including property value impacts). *E.g.*, Applic. Exhs. I (Visual Impact Assessment), L (Shadow Flicker Study), R (Socioeconomic Report), U (Cultural Resources Report), V (Communication Studies), W (Route Evaluation Study). Although Mr. Shears "sponsored" the Application as evidence, he was not qualified as an expert on any of these topics, did not personally prepare the portions of the Application on those topics, and admitted lack of knowledge concerning some of them. UNU Intervenors' Opening Brief at 113. As discussed in Section VII(F) of the UNU Intervenors' Opening Brief, those portions of the Application that were unsupported by a witness with personal knowledge are pure hearsay. Where Buckeye Wind has relied so extensively on hearsay in support of its case, it cannot fairly be deemed to have carried its burden of proof, notwithstanding the relaxed hearsay standard in Board proceedings. *Cf. Erdeljohn*, 38 Ohio Misc.2d at 3-4 ("The virtually exclusive use of hearsay and inferences thereon found in this case has . . . denuded the significant evidence of any probative value and further demonstrates arbitrariness in an extreme degree.").

Furthermore, it was inequitable to allow Buckeye Wind to introduce volumes of unsupported hearsay, while the intervenors were required to produce live witnesses. In her rulings on the admissibility of Dr. Michael Nissenbaum's deposition transcript, expert report,

and affidavit, the ALJ made it abundantly clear that expert testimony would not be accepted unless the witnesses were personally present at the hearing for purposes of cross-examination. Entry, Oct. 21, 2009, at 3; Tr. Vol. VII 1633-34; UNU Intervenors' Opening Brief at VII(D), pp. 105-107. Witnesses were not even permitted to testify telephonically at the hearing. Tr. Vol. VII 1633-34. Moreover, the fact that Dr. Nissenbaum's affidavit was excluded from the record of the public hearing further indicated that the ALJs did not intend to allow hearsay evidence, even if under oath. UNU Intervenors' Opening Brief at VII(D), pp. 105-107.

Had the UNU Intervenors known that reports, articles, data and analyses would be admitted as hearsay without supporting expert testimony at the hearing, the UNU Intervenors could have, and would have, offered additional documentary evidence on a wide range of relevant topics. It is highly prejudicial to all of the intervenors to allow Buckeye Wind the opportunity to offer unsupported hearsay evidence through the Application, but to deny that same opportunity to the intervenors. For these reason, the Board should reconsider and grant the UNU Intervenors' motion to strike the hearsay evidence set forth in the Application and in the testimony of Mr. Shears. UNU Intervenors' Opening Brief at VII(F), pp. 108-114. In the alternative, the Board should admit the testimony of Dr. Michael Nissenbaum (UNU Exh. 66) and reopen the evidentiary hearing for the consideration of hearsay evidence to be offered by the Intervenors.

A. **In Addition To The Other Gaps And Flaws In Buckeye Wind's Evidence Concerning The Public Benefits Of The Project, The Governor's Initiative To Eliminate The Utility Personal Property Tax For Wind Power Shows That The Economic Benefits Of The Project Are Far From Certain.**

In their Opening Brief, the UNU Intervenors explained in detail how Buckeye Wind's claims of public and environmental benefit were unsupported by reliable evidence and that the

overall impact of the Project on Champaign County would be decidedly negative. UNU Intervenor's Opening Brief at III, IV.

Buckeye Wind asserts that the Project will help the State meet its renewable energy goals under S.B. 221. Applicant's Opening Brief at 2-3. However, there is no reliable evidence in the record as to the amount of energy the Project will ever generate. On cross-examination, Mr. Shears' responses about the Project's capacity factor were vague and evasive, and the UNU Intervenor's were barred from pursuing that issue further on cross-examination. UNU Intervenor's Opening Brief at 12. Furthermore, Buckeye Wind's claims of leaseholder payments (Applicant's Opening Brief at 2-3) were entirely unsupported by live testimony and should be disregarded as hearsay for the reasons discussed above.

The Staff has noted the potential tax benefits of the Project. Staff Opening Brief at 32. However, there is no factual or legal basis to quantify the local taxes that would be generated by the Project. Nowhere in the record is there any evidence concerning the percentage of Project leaseholders that reside inside or outside of Champaign County. And in his State of the State Address delivered on Tuesday, January 26, 2010, Governor Strickland announced that he will seek the elimination of the tangible personal property tax for wind energy facilities:

With the federal tax credit currently in place for renewable energy, companies will be making commitments to new facilities in the coming months. But the fact of the matter is that Ohio's tax structure discourages wind and solar companies from coming to Ohio to generate renewable energy.

We should give those companies every reason to choose Ohio. That's why I am asking the legislature to erase Ohio's tangible personal property tax on generation for wind and solar facilities that break ground this year, create Ohio jobs, and begin producing energy by 2012.

In light of this announcement, any projections of tax generation from the Project are totally speculative.

In the end analysis, Buckeye Wind has proven that it will generate only twelve jobs long-term jobs—and not all of them will be based in Champaign County or even in Ohio. Shears, Tr. Vol. I 62. That is the sum total of the reliable and admissible evidence in the record concerning the economic benefits of the Project. Balanced against the substantial evidence of potential impairment of local property rights, loss of property value, and other impacts (UNU Intervenors' Opening Brief at 1, 71-86), the record in this case shows that the Project will be an overwhelming net detriment to Champaign County and to the State of Ohio, and will not serve the public interest, convenience, and necessity from the standpoint of socioeconomic impacts.

B. The Noise From The Buckeye Wind Project As Proposed Will Cause Serious Discomfort, Sleep Deprivation, And Health Problems.

1. The Applicant Has Not Produced Any Credible Evidence That It Is Unable To Redesign The Project In A Manner That Preserves Its Profitability While Protecting The Health And Comfort Of Nonparticipating Neighbors.

Buckeye Wind's statements that it cannot construct its wind project unless the Board allows the wind turbines within 914 feet of neighboring homes and within 590 feet of nonparticipants' land are the pinnacle of arrogance. In essence, the Applicant is telling the Board it must approve the Project as Buckeye Wind wishes to design it, even if the Board, as it should, finds that this design unfairly burdens the community with unwelcomed damage to health and comfort. The Board should assert its authority, as provided in R.C. Chapter 4906, to require Buckeye Wind to properly site its wind turbines.

While Buckeye Wind argues that the UNU Intervenors have requested a 1.25 setback as a ploy to block the Project, this setback is based solely on the distance it will take to reduce wind turbine noise to acceptable levels. UNU's members are not opposed to wind power and, unlike

other Champaign County residents, have not placed “No Wind Turbines” signs in their yards. Johnson, Tr. Vol. V 1187. They merely and justifiably want setbacks that protect them, their land, and their homes. *Id.* at 1187-88. If Buckeye Wind has designed its Project in such a way as to site its turbines too close to other persons’ homes and land, that is its fault, not the Board’s or the intervenors’ doing. If Buckeye Wind intends to cram 70 wind turbines into a crowded county, it should at least engage in responsible siting.

Moreover, there is no evidence that Buckeye Wind is unable to site a wind farm in Champaign County if it does the task responsibly. As explained in the UNU Intervenors’ Opening Brief (at 58), Buckeye Wind has not shown that it is unable to substitute other potential turbine sites for those in its current design that are too close to neighboring properties. No witness, not even Buckeye Wind’s paid witnesses, have testified that Buckeye Wind would be unable to successfully redesign its Project in a way that preserves its profitability while preventing undue damage to the community.

Furthermore, while Mr. Hessler asserts that no wind projects can be sited east of the Mississippi River with a 1.25 mile setback, he presented no studies, no maps, no reports, or any other documentary evidence to support that bald allegation. If this amazing assertion were true, surely some evidence of its truth exists. On the other hand, Mr. Hessler’s ignorance of the existence of wind projects as prominent and nearby as those in Benton County, Indiana demonstrates that he has no basis to make that assertion.

2. The Project Is Not Designed To Prevent Noise Impacts Widely Regarded By The Acoustical Engineering And Medical Fields As Threats To The Public’s Health And Comfort.

Buckeye Wind characterizes (at 19, fn. 6) its noise consultant, David Hessler, as an experienced acoustical engineer and then praises his work on the Project. However, Mr.

Hessler's work on this Project is anything but credible. First, he set five dBA over background, i.e., 34 dBA at night) as the "design goal" for the Project, realizing that this is the usual accepted standard in acoustical engineering for protecting the community from new noise sources.

However, he discovered that numerous homes (at least 1004 of them) will be exposed to noise increases higher than this level, even after skewing his model to predict lower noise impacts.

So then Mr. Hessler drastically lowered the design goal to 40 dBA, which Buckeye Wind's brief (at 22) characterizes as a "working goal." However, Mr. Hessler could not even accomplish this lenient "working goal." Buckeye Wind's brief admits (at 23) that noise levels at as many as 30 nonparticipating residences are predicted to exceed 40 dBA during daytime at a wind speed of six meters per second. Buckeye's brief further admits (at 23) that five nonparticipating residences may be exposed to levels higher than 40 dBA at night, when the occupants are trying to sleep. Having set such a lenient goal, Buckeye Wind then argues that it only slightly exceeds that already meaningless goal by one or two dBA. Then, not having met his liberal 40 dBA goal, Mr. Hessler suggested that 45 dBA be set as the new standard, calculated as a meaningless Leq average. Hessler Rebuttal Dir., Applicant Exh. 26, Ans. 13. Buckeye Wind's design goal is not based on any acoustical or health standard, but is solely based on what Buckeye believes it can achieve without redesigning the Project.

As explained in the UNU Intervenors' Opening Brief (at 36-45), a 40 dBA goal, even if achieved, will not protect the community's health, sleep, and comfort. Mr. Hessler mischaracterizes the 2009 WHO guideline of 40 dBA as "essentially a design goal with an interim target of 55 dBA." However, WHO has made it clear that achieving a noise limit of 40 dBA will not prevent sleep disturbance (*see, id.*), including the 1999 WHO recommendation of 30 dBA as the limit for "a good night's sleep." UNU Exh. 49 at 22. Moreover, the WHO has

emphasized that the 55 dBA “interim target” that Mr. Hessler misleadingly cites will not protect public health and should be considered only where lower levels are infeasible in the short-term, in which case it may be used temporarily “for exceptional local situations.” Applicant Exh. 18 at XVIII. While Buckeye Wind compares 40 dBA of wind turbine noise to 50 to 60 dBA of conversational speech, the two are not analogous due to the annoying characteristics of wind turbine noise. Furthermore, few people can tolerate conversations in their bedrooms when they are trying to sleep. Moreover, as explained in the UNU Intervenors’ Opening Brief (at 49-53), the low frequency noise from turbines is not diminished by passing through residence walls and roofs, and may even increase inside the home due to resonance.

Although Buckeye Wind promotes Kenneth Mundt’s testimony as evidence that wind turbine noise does not cause health effects, Dr. Mundt’s testimony was at best, meaningless, and at worst, misleading. Apparently, Dr. Mundt made an attempt to cherry-pick the literature he reviewed for his opinions, since he ignored the 1999, 2007, and 2009 WHO reports that provide the most definitive information about the health effects of noise. These reports directly and conclusively contradict Dr. Mundt’s statements that there is no causative link between noise and health problems. While Dr. Mundt opined about the adequacy of the short setbacks proposed for the Project, he lacks the acoustical engineering credentials necessary to express such an opinion. Mundt, Tr. Vol. II 452 (admitting he has no training in acoustics). While Buckeye Wind mentions (at 30) Dr. Mundt’s observation that a high school in his state is located directly under a wind turbine, even Don Bauer, a non-expert, recognized that little noise can be heard directly under a wind turbine. Bauer, Tr. Vol. IV 1046; *See also*, James Dir., UNU Exh. 31A, Ans. 67.

Part of the disconnect between Dr. Mundt’s testimony and the findings of the worldwide experts who, unlike Dr. Mundt, are familiar with wind project acoustics, appears to result from

the semantics that he employed in his testimony. Dr. Mundt was careful to limit his opinion to health effects that literature has proven result directly from noise. Mundt Dir., Applicant Exh. 6, Ans. 22. Dr. Mundt does not classify sleep deprivation as a health effect. Mundt. Tr. Vol. II 460. Although he admitted that sleep deprivation can lead to health problems (*id.* at 467, 469, 472-73), he did not evaluate those health problems. That is, he focused narrowly on health problems caused directly by noise.

Rather than focusing on sleep deprivation, the most common health problem from wind project noise, Dr. Mundt testified that the Minnesota Department of Health survey found little evidence that wind turbine noise directly activates the vestibular and autonomic nervous system. Mundt, Tr. Vol. II 541-42. The UNU Intervenors have expressed no opinion in this proceeding as to whether wind turbine noise causes nausea, vomiting, cardiac arrhythmia, and other health effects by disturbing the vestibular system with vibration or sounds entering the head through pathways other than the ear openings. See UNU Exh. 49 at 8, describing the effects of vibrations and other disturbance of the vestibular system. Instead, the UNU Intervenors have focused on the undeniable health problems caused by the sleep deprivation resulting from wind turbine noise. Buckeye Wind's brief (at 31-32) also attempts to divert attention from sleep deprivation and its health impacts by focusing on the vestibular system. This is a mere straw man argument to draw the Board's attention away from the most common health effects resulting from noise-induced sleep deprivation.

While Buckeye Wind argues that Dr. Mundt was the only expert to testify about the health effects of wind turbine noise, his testimony is all that is needed to prove the adverse health impacts of noise. In Dr. Mundt's testimony, he admitted:

- According to a study by Dinges and Banks, whose report he utilized for his opinion, restricting sleep below a person’s optimal time in bed can cause a range of neurobehavioral deficits, including lapses of attention, slowed working memory, reduced cognitive throughput, depressed mood, and perseveration of thought. UNU Exh. 46 at 519 (abstract); Mundt, Tr. Vol. II 471-72. Even the continued restriction of sleep to less than seven hours per night may cause significant daytime cognitive dysfunction. UNU Exh. 46 at 519 (abstract) and 526; Mundt, Tr. Vol. II 473. Reduced sleep is associated with cardiovascular morbidity, traffic accidents, and death. UNU Exh. 46 at 526; Mundt, Tr. Vol. II 476. Dr. Mundt agreed with the foregoing conclusions. *Id.* at 471-73, 476.
- Dr. Amanda Harry found adverse health symptoms up to a mile from wind turbines, including sleep disturbance, headaches, palpitations, stress, anxiety, depression, vertigo, and tinnitus. UNU Exh. 44 at 21, 30; Mundt Dir., Applicant Exh. 6 at 10.
- A study by the National Research Council of the National Academies of Science found that “to the extent that wind-energy projects create negative impacts on human health and well-being, the impacts are experienced mainly by people living near wind turbines who are affected by noise and shadow flicker.” UNU Exh. 45 at 107; Mundt, Tr. Vol. II 464-66.
- Dr. Michael Nissenbaum has found that 14 of 15 neighbors living within 1200 to 3400 feet of the Mars Hill wind project have experienced health effects such as sleep disturbance, headaches, dizziness, weight changes, tinnitus, and hypertension. *Id.* at 530-33; UNU Exh. 51.

- A study by Eja Pedersen found that 16% of the persons exposed to wind turbine noise above 35 dBA were afflicted by sleep disturbance. Mundt, Tr. Vol. II 483-84; UNU Exh. 47 at 3467.
- According to the WHO, as described in a survey by the Minnesota Department of Health, a large proportion of low frequency noise in wind turbine sound “may increase considerably the adverse effects on health.” UNU Exh. 49 at 20; Mundt., Tr. Vol. II 504. The same survey recited a WHO recommendation that noise be limited to 30 dBA for a “good night’s sleep.” *Id.* at 506; UNU Exh. 49 at 22. Despite the obvious relevance of the WHO statements discussed in the Minnesota survey, Dr. Mundt chose not to mention the WHO report in his direct testimony. Mundt, Tr. Vol. II 504.

Dr. Mundt’s opinions suffer from another malady. As an epidemiologist, he proclaims to believe that, until the epidemiological literature discusses a direct link between wind turbine noise and health problems, it must be assumed not to exist. Mundt Dir., Applicant Exh. 6 at Ans. 22. This is the same ploy that experts employed by the tobacco companies used for decades to dispute the causal link between smoking and cancer. Mundt, Tr. Vol. II 548-49 (admitting that “for decades the tobacco companies claimed that there [were] no demonstrative adverse health effects caused by smoking tobacco in the epidemiological studies”). As Dr. Mundt admitted, the lack of literature of this description does not mean that there is no link. Mundt, Tr. Vol. II 463. It just means no one has written on it yet using methodology approved by epidemiologists, or that epidemiologists have cherry-picked the literature to support their views, just as Dr. Mundt did when he ignored WHO’s reports. Nevertheless, based on that slender logic, Dr. Mundt opines that no setbacks are necessary to protect the health of the community from wind project

noise. Mundt Dir., Applicant Exh. 6, Ans. 22. However, since ample literatures shows a direct link between wind turbine noise and sleep disturbance, and ample literature shows a direct link between noise and health problems, it is irresponsible to pretend that no setbacks are needed to prevent health impacts from wind turbine noise.

Apparently realizing the deficiencies in Dr. Mundt's testimony, Buckeye Wind pretends (at 32-33) that Christopher Shears is an expert on the health impacts of wind turbine noise (among his many other areas of expertise, according to the Applicant). Mr. Shears thinks there are only a "handful of possible cases" of health impacts that have been raised. Apparently, Mr. Shears has not visited Mars Hill, Maine to learn about the sleep disturbance, headaches, dizziness, weight changes, and other health problems experienced by the neighbors of that wind project. Mundt, Tr. Vol. II 530-34; UNU Exh. 51. Nor apparently has he talked to the residents near the wind project in Illinois where Rene Taylor resides, and whose family has suffered sleep deprivation, headaches, irritability, ear pressure, fatigue, and heart palpitations. Taylor Dir., UNU Exh. 65 at 3. And, apparently, he is not familiar with the wind turbines found by Dr. Amanda Harry to be causing sleep disturbance, headaches, palpitations, stress, anxiety, depression, vertigo, and tinnitus. UNU Exh. 44 at 21, 30; Mundt Dir., Applicant Exh. 6 at p. 10. Evidently, he has not read the literature that Dr. Mundt reviewed for his opinions, as well as the WHO reports that Dr. Mundt attempted to sweep under the rug.

Buckeye Wind argues (at 33) that Larry Wunsch did not testify about any health problems he has experienced. That is true, but pointless. Not everyone exposed to loud noise is affected the same way and not everyone will suffer health maladies from bothersome noise. Buckeye Wind also states (at 34) that Mr. Wunsch opposed the turbines before construction, and

people report more symptoms when upset about something. However, one need only listen to Mr. Wunsch's recording to hear how annoying the wind turbine noise is at his home.

Buckeye Wind also argues (at 34) that, except for ear pressure and chest palpitations, Rene Taylor and her family were already experiencing the same types of health problems, albeit less frequently, before the wind turbines arrived. This mischaracterizes Ms. Taylor's testimony. Ms. Taylor actually said that everyone has headaches or sleepless nights from time-to-time, but there is big difference between the home's occupants having two or so headaches per month before the turbines arrived and having three to four headaches per week afterwards. Taylor, Tr. Vol. V 1089. Moreover, no one can claim that her family's new symptoms -- ear pressure and heart palpitations (*id.* at 1095) -- are not serious problems.

Buckeye Wind also implied (at 33) that Ms. Taylor was making up her testimony about the health effects she and her family are experiencing, because she opposed the wind project and sued its owner before construction. However, even the wind developer for that project has found her testimony so credible that it has offered to "make an arrangement where I wouldn't give any more testimony at the expansion hearing" for that project, i.e., a cash offer. Taylor, Tr. Vol. V 1078, 1080.

While Buckeye Wind argues that up to 40 dBA or even 45 dBA is no problem, this assertion rides solely on the statements of David Hessler. Mr. Hessler opined that his own noise measurements show that these noise levels are not problematic. Mr. Hessler did not produce a single engineering standard or piece of literature to support his opinion, other than to misrepresent the findings of the 2009 WHO report. He produced no objective surveys showing that these noise levels are acceptable, in contrast to Eja Pedersen's controlled studies showing substantial noise impacts above 35 dBA. UNU Exh. 47. While he sought to discredit Ms.

Pedersen's work by misleadingly comparing the total number of persons surveyed by her questionnaires with the number of persons annoyed by wind turbine noise, the total number of surveyed persons included a large number of persons (212 out of the 341 surveyed) who were not exposed to noise levels over 35 dBA. Mr. Hessler repeatedly admitted that his procedures for measuring noise did not follow accepted acoustic engineering practices. In fact, Mr. Hessler revealed the lack of support for his methods in the acoustic engineering field in his statement that he is "not real fond of other people's research." Hessler, Rebuttal Tr. Vol. I 2364. Some of his testimony is even contradicted by studies authored by his own father.

In contrast, the UNU Intervenors' expert, Richard James, has used objective criteria from respected acoustical engineering standards and noise literature to formulate his opinions about the noise from this Project. Mr. James is superbly qualified to make these evaluations, since he developed the use of computer models and contour maps to depict noise from new facilities, the same techniques that Mr. Hessler has employed for the Buckeye Wind Project. James Dir., UNU Exh. 31A, Ans. 52. Since Mr. James' presentation to the Institute of Noise Control Engineers on these methods in the early 1970s, almost all acoustical engineers utilize them. *Id.* He has also developed noise modeling software for industry. *Id.* at Ans. 11.

Mr. James has served on the ANSI standards committee that sets acoustical engineering standards followed worldwide, and has contributed to IEC standard 61400-11, the standard used by turbine manufacturers to measure the noise of their turbines. UNU Exh. 31 at 1. Unlike Mr. Hessler, who has represented only industry, Mr. James has had a balanced 40-year career representing industry, government, and citizens. James Dir., UNU Exh. 31A, Answers 4, 7-19. For decades, he worked with such companies as General Motors, Ford, Chrysler, Toyota, Mazda, John Deere, Navistar, Anheuser-Busch, Mitsubishi, and Goodyear. *Id.* at Ans. 11, Ans. 13. He

has worked with the Occupational Safety and Health Administration (OSHA) and the National Institute of Occupational Safety and Health (NIOSH) to establish safe noise levels for industrial workers. *Id.* at Answers 6, 14, 15, 22; UNU Exh. 31 at 2. For 12 years, he taught a Masters level course on noise control and hearing conservation at Michigan State University. James Dir., UNU Exh. 31A at Ans. 20; UNU Exh. 31 at 3.

Mr. James has also had considerable experience with wind turbine noise. He started studying wind turbine noise from operating turbines in North America in 2008, the year after the first major wind projects started operating in North America. James, Tr. Vol. VI 1451-52. Prior to that time, in late 2002, he had already started to study wind turbine noise problems being experienced with wind projects in Europe. *Id.* at 1453; James Dir., UNU Exh. 31A, Ans. 21. While his medical condition prevents him from attending wind turbine conferences in Europe, he has stayed current on their presentations by reading their written papers. James, Tr. Vol. VI 1379, 1448-49. He also shares libraries of information on wind turbine acoustics with other acoustic engineers to stay current on this topic. *Id.* at 1449. He has used his decades of noise modeling expertise to “routinely” model wind turbine noise at wind projects that have harmed their neighbors. *Id.* at 1389. Although Buckeye Wind has attempted to disparage his work by contending that he does not model every turbine in the wind projects he studies, his work has been performed for individual landowners harmed by one or more turbines from each project. *Id.* at 1389-90. That is, it takes only one poorly sited wind turbine to destroy a neighbor’s health and comfort.

Based on Mr. James’ decades of experience in advising industry and government on noise standards and his five years evaluating European wind project problems, in 2008 he collaborated with George Kamperman to prepare a common-sense guide for siting wind turbines.

Id. at 1387-88, 1453-56; UNU Exh. 32.¹ Since the first major North American wind projects started operating, he has traveled extensively to measure the turbines actual noise levels. *Id.* at 1456-57. While Mr. Hessler claims to performed validation measurements on five wind projects, Mr. James has done six, including sound measurements at the Noble Bliss project which proved the inaccuracy of Hessler & Associate’s modeling for that project. *Id.* at 1456-57, 1461-62.

While Mr. James’ recommendations have not always been followed by government bodies, other government entities have adopted them. *Id.* at 1384-86. Those that have ignored his recommendations have harmed their communities. *E.g., see id.* at 1392-93 (after the Tazewell County Zoning Board failed to follow his recommendations, he was called back to the community to assist “a client there who has a noisy turbine located in his backyard”).

However, despite the respect that the acoustic engineering community has for Mr. James, *e.g.*, as shown by his appointment to ANSI standards committee, the Board need not depend solely on his opinions to determine what noise limits should be incorporated into Buckeye Wind’s Certificate. Unlike Mr. Hessler’s field work, Mr. James’ field work is performed in compliance with the widely accepted acoustical standards for measuring sound. Unlike Mr. Hessler’s opinions about the acceptable thresholds for noise, Mr. James’ opinions are corroborated by the work of other respected acoustic engineers and by medical experts who have evaluated the harmful effects of noise. Even without Mr. James’ opinions, the Board need only consider the findings of such authorities as the WHO, Pedersen, Harry, the University of

¹ Buckeye Wind introduced a paper by Geoff Leventhall criticizing the findings of the Kamperman/James paper about low frequency noise. Applicant’s Exh. 16. However, Dr. Leventhall is a consultant for the wind power industry, and as such, his opinions are obviously biased in favor of that industry. Furthermore, his opinions on behalf of the wind industry conflict with earlier positions he took on behalf of the British government earlier in his career before he started assisting the wind industry, and are entitled to no weight. James, Tr. Vol. VI 1417. Dr. Leventhall also misinterpreted the formula recommended by Kamperman/James for regulating low frequency noise, which subtracts background pre-construction low frequency noise so that only the low frequency noise from wind turbines is regulated. *See* page 53 of the UNU Intervenors’ opening brief. That Dr. Leventhall’s conclusions about low frequency noise are suspect is confirmed by the opposite conclusions in a paper written by George Hessler, before he became a consultant for the wind industry. UNU Exh. 69.

Groningen and Goteborg University, the German national government, and the Minnesota Department of Health, not to mention Mr. Hessler's own admissions, to identify the appropriate limit for noise as five dBA above background and a ceiling of 35 dBA.

3. **Buckeye Wind's Predictions Of Turbine Noise Levels Are Anything But "Conservative."**

Buckeye Wind's predictions of noise are hardly conservative. For example, is it conservative to evaluate noise levels during the time of the year when leaves are not rustling and insects are not singing, when those conditions exist for six months of the year? *See* Strom, Tr. Vol. VIII 1914-15. Is it conservative to assume that wind conditions will never be quiet on the ground while the turbines are turning, even though this stable atmospheric condition is actually common? Is it conservative to evaluate the noise levels reaching a person's home when the wind direction is from a turbine to a person's home, when this is a frequent occurrence? *Id.* at 1915. Is it conservative to model all turbines as point sources when some are line sources, and when even Buckeye Wind's representative testifies that some should be modeled as line sources? Is it conservative to assume the model is accurate, when it actually has a five dBA margin of error? Is it conservative to model a turbine that is quieter than the Nordex N100 model that ultimately could be selected for the Project? Obviously, the answer to each of these questions is "no." Buckeye Wind's noise study not only lacks conservatism, it is irresponsible and misleading.

4. **The Board's Prior Decisions On Dissimilar Facilities And The Staff's Position In The Instant Case Provide No Meaningful Guidance For Controlling Wind Project Noise.**

As the ALJs have aptly noted, the Board's Staff is "just another party making another recommendation to the Board." Tr. Vol. VIII 1868. The Staff's position is "another position to be considered by the Board when making their final determination." *Id.* Mr. Strom also acknowledged that the Board's decision will be best informed if it considers all parties'

evidence, not just the Staff's recommendation. Strom, Tr. Vol. VIII 1849. The Staff's post-hearing brief echoed (at 7-8) these observations.

Although the Staff's brief states (at 25) that "the noise modeling conducted by the Applicant was reasonable," the brief noticeably lacks any supporting discussion of facts or rationale. If the Staff actually believed Mr. Hessler's study was accurate, it would have enunciated some basis for that conclusion. As explained below, the Staff's statements in the Staff Report and brief about noise are entitled to no weight and the Board should disregard them.

Buckeye Wind contends (at 17-19) that the noise volumes predicted for the Project are reasonable and will not have an adverse impact, because the Board has allowed other facilities to emit even higher noise levels. Buckeye Wind cites five Board opinions that approved certificates for facilities projected to produce various maximum levels of sound at neighboring residences or property lines: 50 dBA; 54 dBA; 59 dBA; 67 dBA; and 75 dBA.

Staff member Raymond Strom, in response to leading questions from Buckeye Wind's counsel, testified that the Board has had a "rule-of-thumb" standard of 50 dBA for the property line, or possibly 55 dBA, he wasn't sure. Strom, Tr. Vol. VIII 1937-38. He said that he thought 50 dBA "was referenced frequently as a property line number" in past Board cases (*id.* at 1880-81), but apparently the review of the Board's decisions by Buckeye Wind's counsel has not revealed any such cases. The approved noise levels at property lines in decisions touted by Buckeye Wind were 55 dBA (AMP-Ohio), 67 dBA (Aquila Fulton), and 75 dBA (PG& E). *In re American Municipal Power-Ohio, Inc.*, Case No. 06-1358-EL-BGN, Opinion, Order, and Certificate, Mar. 3, 2008 ("AMP-Ohio"), at 39; *In re Aquila Fulton County Power, LLC*, Case No. 01-1022-EL-BGN, Opinion, Order, and Certificate, May 20, 2002 at 12, 15; *In re PG&E Dispersed Generating Co.*, Case No. 00-922-EL-BGN, Opinion and Order, Feb. 12, 2001 at 22.

Given the inconsistency in the Board's prior practices, the Board's past decisions provide no support for using 50 dBA, 55 dBA, or any other number as the usual standard for the property line.

This list of approved noise levels has two characteristics that betray the Staff's lack of expertise in noise regulation. First, no approved noise level appears twice – they are completely random. Second, there is a broad range of 25 dBA between the lowest and highest authorized noise level. There's "no rule-of-thumb" at all. If the Staff advising the Board in these cases had any concept about what noise levels are safe, healthy, and tolerable, the authorized sound levels would be consistent rather than wildly variant.

In only two of these cases did any intervenors make an appearance to test any of the representations made by the applicants about their projects. Even those two cases mention no noise information produced by the intervenors. In short, there appears to have been no effort in the cited cases to test the applicants' assertions about the effects of their noise levels on the neighbors' health and comfort. Having no such information and no acoustical expertise of its own, the Staff in those cases simply acquiesced to the noise levels the applicants predicted their projects would produce.

Moreover, as a legal principle, the Board may not use opinions or findings in other cases as evidence to support its decision in the instant case. Facts in other cases have not been heard or tested by cross-examination in the instant case. Furthermore, as one court has expressed it, "[t]he rationale for the rule that a trial court cannot take judicial notice of proceedings in a separate action is that the appellate court cannot review the propriety of the trial court's reliance on such prior proceedings because that record is not before the appellate court." *NorthPoint Properties, Inc. v. Petticord*, 179 Ohio App.3d 342, 348 (8th Dist. 2008). For these reasons, it is

erroneous to take judicial notice of facts described in court opinions, even if those opinions are issued by the same court. *Id.* Also see *Sinclair v. Sinclair*, 182 Ohio App.3d 691, 695 (4th Dist. 2009) (a court may not take judicial notice of prior proceedings in the court, but may only take judicial notice of prior proceedings in the immediate case); *Diversified Mortg. Investors, Inc. v. Athens County Bd. of Revision*, 7 Ohio App.3d 157, 159 (4th Dist. 1982) (same holding). Consequently, the approved noise levels in the Board's other cases provide no guidance herein, and to use them as a basis for the Board's decision would be error.

There is also no evidence that the Board's conclusions about noise in other cases are factually applicable to the instant case. While the Buckeye Wind Project area is a very quiet rural community, some of the other cases involved additional facilities in industrialized areas where the noise was already high. This is an important distinction between these prior Board cases and the present case, because existing sound masks new noise sources. For example, the home nearest the PG&E facility was already exposed to 50 dBA prior to facility operation. *PG&E* at 6. While this home was located 2000 feet from the facility, the Board's certificate prohibited noise levels above 56 dBA at 1000 feet from the facility, making it likely that facility noise levels would decrease to the pre-existing level of 50 dBA by the time it reached the home. *Id.* at 10. The pre-existing noise levels near the Duke Energy Hanging Rock facility ranged from 61-65 dBA in daytime and above 50 dBA at night. *In re Duke Energy Hanging Rock, LLC*, Case No. 01-175-EL-BGN, Opinion, Order and Certificate, Sept. 17, 2001 at 17. The facility was projected to produce 51-59 dBA of noise, i.e., less than the ambient levels, and the Board prohibited the applicant from exceeding that level. *Id.* at 17, 22. In both of these cases, the Board prohibited the facilities from increasing the noise levels in the communities. In two other cases, the Board's opinions do not reveal the ambient background noise levels, so whether the

facilities would increase the noise levels is unknown. Accordingly, none of these cases are inconsistent with evidence from the UNU Intervenors and admissions by Buckeye Wind's witnesses that sound increases over five dBA are intrusive. If anything, they support the finding that the Board should not approve noise increases above five dBA.

The Board approved 67 dBA for the property line and 60 dBA for the residence of the nearest neighbor in the Aquila Fulton County Power application, even though these noise levels would have such a serious adverse effect that the applicant "offered to buy this property should the owner wish to move." *Aquila Fulton* at 12, 15. Surely, this is not a case the Board wishes to use as precedent, although this will be the Project's effect if the Board accepts it as is.

Without testing the noise information that may have been produced in the other cases, there is no evidence that it has any applicability to the instant case. However there is substantial information to the contrary. For example, none of the Board's past opinions dealt with wind turbines. None of the past approved facilities appear to produce the amplitude modulation that afflicts the neighbors of wind farms. The noise levels tolerated in prior Board decisions have no value in assessing wind turbine noise, which is highly annoying and sleep depriving at much lower levels than other noise sources.

In addition, none of the other facilities appear to have threatened the number of neighbors that Buckeye Wind's Project does. While every person deserves the government's protection from harmful impacts, the thousands of persons threatened by Buckeye Wind's noise set this Project aside from the others.

Buckeye Wind's suggestion that 55 dBA at the property line is adequate is belied by Mr. Hessler's own testimony. In his direct testimony, he stated that noise levels over 45 dBA "have led to what I would consider justified complaints." Hessler Rebuttal Dir., Applicant Exh. 26,

Ans. 13. While Mr. Hessler was referring to noise levels at neighboring residences, the same noise levels will bother persons who, as they have the right to do, build new homes near their property lines or wish to enjoy recreational or occupational activities on their land.

Given the lack of credibility of Mr. Hessler's arguments, it is not surprising that Buckeye Wind attempts to bolster its position by arguing that the Staff is experienced in noise control and came to the same conclusions. However, while Buckeye Wind proclaims that the Board's prior decisions on noise demonstrate the Staff's experience with noise, the wildly inconsistent noise levels approved in those cases illustrate the opposite.

Furthermore, the Staff gave the noise evaluations in those cases so little thought that the Staff member responsible for reviewing noise studies, Raymond Strom, could not remember the past projects in which he had reviewed noise issues other than one project he vaguely referred to as the "Norton project." Strom, Tr. Vol. VIII at 1875-76, 1878. He could not recall the noise issue from a case decided as recently as 2008 even while reviewing the decision. *Id.* at 1938-39.

The Staff has revealed no expertise in acoustics that would lend any credibility to its acquiescence to Mr. Hessler's study. Mr. Strom has degrees in botany and zoology, not acoustical engineering. *Id.* at 1844, 1856. Mr. Strom was aware of no Staff employee with an acoustical engineering degree. *Id.* at 1872. The Staff did not consult with any employee in state government with acoustical engineering expertise, nor did it recruit anyone with acoustical expertise to review Buckeye Wind's noise study. *Id.* at 1846-47, 1872. Mr. Strom betrayed the Staff's lack of knowledge about noise impacts by admitting:

- He has no specialized training in acoustics (*id.* at 1856);
- He has had no training of any kind in noise modeling (*id.* at 1878);

- He attempted to educate himself about noise issues by reading some noise articles on the internet, but could not even remember what publications he had read (*id.* at 1850, 1872-73);
- He did not review the noise report prepared by the Champaign County Wind Turbine Study Group to familiarize himself with the issues in this case (*id.* at 1850);
- The Staff has no modeling software to test the validity of an applicant's noise model (*id.* at 1853, 1856);
- He was not familiar with the acoustical engineering standards that must be followed to measure noise accurately, nor did he utilize them to determine whether Mr. Hessler's work was accurate (*id.* at 1879);
- He did not know where microphones may or may not be placed to obtain accurate noise measurements in a background noise study (*id.* at 1879);
- Until reading the reports in this case, he was unaware that the acoustical engineering field commonly uses five dBA above background as the threshold for determining the effects of new sources of noise (*id.* at 1891);
- He did not know that background noise measurements are supposed to be taken during winter to avoid leaf rustle and insect noise (*id.* at 1913);
- He did not know whether wind turbines should be modeled as line sources or point sources (*id.* at 1924);
- While professing a lack of concern about health problems from noise, he also admitted that he was unaware of the WHO findings on health problems from noise (*id.* at 1926, 1930); and

- He was unfamiliar with reports by Pedersen and others on annoyance from wind project noise (*id.* at 1930, 1933).

Regrettably, in this case, the Staff in the instant case has fallen back on its old habits despite the availability of ample information about the harmful effects of noise. That is, just as in previous cases, it has meekly accepted whatever noise levels the Applicant wants to produce. Mr. Strom knew that entire subdivisions of homes are predicted to suffer from noise levels more than five dBA over background. Strom, Tr. Vol. VIII 1898. Nevertheless, the Staff gave little thought to noise problems in the instant case. Mr. Strom did not meet with Buckeye Wind to discuss the noise issues. Strom, Tr. Vol. VIII 1876. He said, “I suspect that we covered noise” in a telephone conversation with Buckeye Wind representatives, but he was not sure. *Id.* He knows he did not talk to the Applicant’s noise consultant. *Id.* at 1912. He did not test the accuracy of Buckeye Wind’s background study, but merely read Mr. Hessler’s discussion of it in the Application. *Id.* at 1879. The Staff would not meet at all with the UNU Intervenors despite their request for an opportunity to discuss the Application with the Staff. Siegfried, Tr. Vol. VIII 1816. In short, the Staff did little to educate itself about the noise impacts from the Project, and studiously ignored information that the public endeavored to educate them. Now, the Staff is ignoring the evidence brought to its attention in the hearing.

At the time the Staff was reviewing the Application, it knew that the noise study had ignored the noisiest candidate turbine model, the Nordex N100, but the Staff did nothing about it then or now. Strom, Tr. Vol. VIII 1900-01. The Staff should have insisted that Buckeye Wind redo its model before the hearing, using the correct model. The Staff’s report and brief do not even recommend that the Board preclude Buckeye Wind from using this model or resubmit the model for the Board’s review, even though Mr. Hessler admits that his model has to be redone if

it is used. Proposed Staff condition 50 would allow Buckeye Wind to use any of three turbine models contained in the Application. Buckeye Wind's brief asks (at 16-17) the Board to allow it to select any turbine model as long as it informs Staff of its selection and provide information "that the impacts associated with the turbine would not exceed those associated with the three turbine models listed in the Application." So even though Buckeye Wind has not modeled the noise from the Nordex N100, it still wants the option to select any other model that is just as noisy.

Based on its ignorance of acoustics, the Staff simply adopted Buckeye Wind's false assertions that its study represents "conservative" assumptions, when it actually grossly underestimates noise impacts. In sum, the Staff's report does no more than summarize Buckeye Wind's noise study.

Even Mr. Hessler's answers to questions of Staff's counsel during the hearing identified unacceptable noise impacts of up to 42 dBA -- 13 dBA over Mr. Hessler's background sound readings of 29 dBA. Hessler, Tr. Rebuttal Vol. I 2383-91. At least 1004 homes will be exposed to noise over 34 dBA, which is higher than the acceptable five dBA increase over background. Nevertheless, the Staff has done nothing to critically evaluate the Applicant's noise study. To say the least, the Staff's lack of effort and candor displays a disappointing reluctance to do what it knows is necessary not only to protect the public, but to prevent the damage to the wind power industry that will result from the public relations fallout from this poorly designed Project.

While the Staff may believe that its unquestioning acquiescence to the Applicant's wishes will promote the production of wind energy in Ohio, its lack of leadership will have the opposite effect. If the Board allows this Project to proceed without reducing its noise levels to a safe and

comfortable level, the outcry will discourage any other community from welcoming wind energy production to their neighborhood.

While the Board may not have possessed any information about the harmful effects of high noise volumes in past cases, it has adequate information in the instant case to make an informed decision. Unlike in past cases, the UNU Intervenors have produced expert testimony revealing the harmful effects of the noise levels predicted by the Applicant's own noise consultant, and the Applicant's own evidence confirms these harms. Unfortunately, the effect of this Project is not limited to giving "one person a headache once a year" as hypothesized by Buckeye Wind's counsel. Tr. Vol. VIII 1934. The UNU Intervenors urge the ALJs and the Board to carefully consider the evidence in this case rather than rubberstamping the Applicant's project.

5. The Certificate Needs To Have An Enforceable Noise Limit That Provides Clarity On The Standard To Be Met.

Despite the criticality of noise issue, the Staff Report recommends only two generally worded conditions to prevent noise problems in the Project area. One condition requires "[t]hat the Applicant operate the facility within the noise parameters as set forth in its noise study and presented in its application." Staff Exh. 2 at 57, Condition 6.

This condition falls far short of protecting the public against unacceptable noise volumes. Condition 6 contains no decibel limit that Buckeye Wind must meet. Given that everyone, including Buckeye Wind, now knows that the Applicant's noise model grossly under-predicts the noise levels at neighboring land and homes, it is not surprising that the Applicant has not endorsed a definite numeric limit for the noise levels allowed from the Project. Mr. Strom testified that he thought Condition 6 would adequately protect the public despite errors such as modeling the wrong turbine model. Tr. Vol. VIII 1901. But he also testified that he would only

consider the Project in noncompliance “if under the normal course of operation over extended periods of time [it is] found to be operating outside these parameters.” *Id.* at 1902.

Notwithstanding that the Application predicts unacceptably high noise volumes, apparently Mr. Strom believes that Condition 6 does not even consistently hold the Project to those levels. So, does this condition allow Buckeye Wind to emit noise higher than modeled for 50% of the time? How high may the volume be during these times of excursion? Does this condition allow higher noise levels to be heard at neighboring land and homes during the stable atmospheric conditions that have produced the most complaints from other projects? How long may the Applicant exceed the modeled levels before it is deemed noncompliant? Certainly, if the Board ever attempts to enforce this condition, Buckeye Wind will argue that it is vague and subject to a multitude of interpretations.

To have any meaning, the Certificate’s conditions must incorporate objective standards. In fact, this may be the only valid conclusion that can be drawn from the Board’s prior approvals of noise conditions. While some of the Board’s prior certificates have contained vague noise restrictions, others have included objective, numeric noise levels that the applicant must meet. For example, the condition cited by Buckeye Wind in *Fremont Energy* requires the applicant to “maintain sound levels resulting from the operation of the facility at or below 50 decibels A scale at the nearest noise sensitive receptor.” *In re Fremont Energy Center, LLC*, Case No. 00-1527-EL-BGN, Opinion, Order, and Certificate, May 21, 2001 at 16. While this condition is not perfect, e.g., the meaning of a “noise sensitive receptor” is unclear, at least it provides a specific decibel level to be met. Similarly, the PG&E certificate restricts noise levels to “at or below 75 dBA at the property line of the facility and at or below 56 dBA at 1,000 feet from the facility.”

A specific numeric limit is also necessary to address Buckeye Wind's fear that negative attitudes towards wind turbines produces a subjective perception that the noise is too loud. As an aside, the fact that a person annoyed by wind turbine noise is more likely to have negative feelings about wind turbines can hardly be a surprise, since annoying wind noise obviously causes negative feelings. The correlation between negative attitude and annoyance can just as easily be explained by the fact that persons profiting from noise-producing structures usually are not annoyed by the loud noise, just like the driver of the "boom box" car. *See* Mundt Dir. Testimony, Applicant Exh. 6 at 9 (acknowledging that the economic beneficiaries of wind projects are less bothered by the noise). Nevertheless, Buckeye Wind makes the point (at 28) that a complaint procedure may be used to separate legitimate noise complaints from subjective complaints fueled by attitude. But if the Certificate contains no specific numeric standard, there will be no objective means to determine whether the noise is too high.

6. The Complaint Resolution Procedure Should Be Modified To Make It Meaningful.

The other noise condition included in the Staff Report requires that the Applicant submit a "completed noise complaint resolution procedure" for Staff approval. Staff Exh. 2 at 59, Condition (8)(j). The complaint resolution procedure has not yet been submitted to the Board. Strom, Tr. VIII 1858-59. The Board should require the Applicant to submit the procedure as part of the Application, so that the public can provide input to increase its effectiveness. The complaint resolution procedure should be expanded to include complaints about other issues as well as noise.

In addition, the Board's Staff should investigate the complaints, not the Applicant. As explained in the UNU Intervenors' Opening Brief, the sponsor of the noise model should never validate the operating levels of the noise source. Obviously, the inherent bias in allowing the

offender to evaluate the merits of the offenses would make such a complaint evaluation process meaningless. To overcome this bias, the Certificate should require Buckeye Wind to provide the Staff with the funds necessary to retain a consultant answerable only to the Staff to investigate any complaints, or require Buckeye Wind to reimburse the Staff for retaining a consultant for that purpose. The Board will need the assistance of a consultant to respond to the inevitable complaints about noise, shadow flicker, and other problems due to their sheer number if the Project is irresponsibly sited as proposed.

Furthermore, even if the complaint resolution procedure calls for the Applicant to receive and investigate the complaints, the Applicant should forward a detailed record of each complaint to the Board so that the Board and the public can monitor the adequacy of the Applicant's responses, and the degree to which the Project is causing problems.

Most importantly, a complaint resolution procedure of any description is worthless without an objective standard to evaluate the merits of the noise complaints. While Buckeye Wind says that a complaint resolution procedure will provide an objective means to determine whether noise is too loud, it cannot do so if the Certificate does not identify a decibel level that is too high. Without a numeric noise limit, there will be no standard to adjudge whether a complaint is valid. Just as prior Board decisions, there must be specific limits on the noise levels.

The Certificate must also require the Applicant to submit a plan to reduce noise levels if found to be higher than the limit. This is consistent with the Staff's observation that the magnitude of this Project and its potential impacts make the implementation of mitigation and, when possible, avoidance measures critical to minimize impacts. Staff's Opening Brief at 14. The certificate in *AMP-Ohio* required such a condition, and it makes sense here. *AMP-Ohio* at

39. Without an objective noise limit and a procedure to mitigate higher levels, the complaint resolution procedure is merely window dressing to disguise the ineffectiveness of the noise control measures in the Certificate.

C. **Shadow Flicker Is Indisputably A Nuisance Impact Of The Project That Warrants Effective Mitigation.**

Buckeye Wind tries in vain to diminish the impact of witness Larry Wunsch's video (UNU Exh. 30), observing that because the video of shadow flicker was taken in his shed rather than his house, there must not be any flicker in his house. Applicant's Opening Brief at 55. Mr. Wunsch's comments on the video clearly refute that contention. He states, "Inside the house the effect is the same as if someone were turning a light switch on and off." UNU Exh. 30 at 00:01:30. The point of the video clips of flicker in his shed was to "show you what it is like, so if someone would have windows that would be pretty much covering one side of their house, this is the light coming in through the house now with the flicker." *Id.* at 00:02:40. Mr. Wunsch's video speaks for itself. It starkly illustrates the nuisance effects of shadow flicker, both outdoors and indoors.

Buckeye Wind further argues (at 52) that Denmark's 10-hour shadow flicker exposure threshold is irrelevant because Ohio is at a lower latitude than Denmark. Of course, differences in latitude have nothing to do with the reasonableness of shadow flicker exposure. What is deemed a reasonable threshold for people in Denmark should be reasonable for people in Ohio as well. If anything, the difference in latitude should make it easier for Buckeye Wind to comply with a 10-hour flicker exposure threshold, since the higher angle of the sun at lower latitudes will lead to less annual flicker exposure to mitigate. Applicant's Opening Brief at 53; Doss, Tr. Vol. IX 2221-22.

As is the case with Buckeye Wind's "design goal" for wind turbine noise, it has proposed an exposure threshold of 30 hours/year but then disregards it when convenient. According to its shadow flicker modeling, five of its turbines will contribute to shadow flicker on neighboring properties in excess of the proposed 30 hours/year threshold. Staff Exh. 2 at 44. This is not only unfair and unreasonable as to the affected neighbors, it is also vague and unenforceable as a means of mitigating nuisance impacts of the Project. Turbines that are shown by modeling to exceed the established shadow flicker threshold should not be constructed.

D. The 500-Foot Minimum Setback Recommended By Staff Has Been Proven At Hearing To Be Inadequate To Protect Neighboring Properties From The Hazards of Blade Shear And Ice Throw.

It is disappointing that the Staff remains apparently unconcerned about the potential hazards to neighboring properties from blade shear and ice shedding, despite the evidence at the hearing demonstrating the deficiencies in the Staff Report's treatment of these topics. Although the Staff asked Buckeye Wind on September 16 for an equation or calculation of the maximum distance for blade throw or ice throw from the three turbines being considered by Buckeye Wind (Staff's First Interrogatories ## 18, 21), they were still awaiting that information from Buckeye Wind at the time of the evidentiary hearing. Conway, Tr. Vol. VIII 1990. Yet, despite an admitted lack of information, and despite industry standards that call for greater setbacks, the Staff adamantly maintained at the hearing that the 500-foot statutory minimum property line setback would be adequate to protect neighboring properties. *Id.* at 1988.

Andrew Conway acknowledged that at the time of the evidentiary hearing, the Staff did not have an adequate means of calculating the maximum distance for blade throw from a 100-meter tower. *Id.* at 1987. Instead, he simply accepted the representation of Buckeye Wind's consultant that the maximum blade throw distance for an 80-meter tower with an 80-meter rotor

was “approximately 500 feet.” *Id.* at 1983, 1986. Mr. Conway acknowledged that a blade from a larger turbine, such as those proposed for the Project, could be thrown further. *Id.* at 1983.

With regard to ice shedding, Mr. Conway relied on representations in the Application that “ice typically lands within 300 feet and that the risk is negligible beyond 722 feet.” *Id.* at 1990. Again, he did not confirm that representation through any independent means. *Id.* He was unaware of guidance from GE Energy (UNU Exh. 13) recommending a “safe distance” of 984 feet for ice throw, based on a formula of $1.5 \times (\text{hub height} + \text{rotor diameter})$. *Id.* at 1992-93.² The GE document states that its recommendations are based on “recognized industry practices” and are recommended by the certifying agency Germanischer Lloyd and the German Wind Energy Institute. UNU Exh. 13 at 1. Yet despite admitting that he was unfamiliar with the GE guidance, Mr. Conway dismissed it, explaining that “I understand that this formula is to be used where there is heavy icing conditions and heavy icing areas, and I’m not aware that Ohio is a heavy icing area.” *Id.* Nowhere in the GE guidance, however, did it state that the “safe distance” formula was limited to “heavy icing areas.” UNU Exh. 13. Mr. Conway also stated that he believed that Buckeye Wind would not operate the turbines when there is ice on the blades (Conway, Tr. Vol. VIII 1993), but conceded that the Staff Report did not recommend a condition that prohibits such operation. *Id.* at 1994. Such a recommendation is also not included in the Staff’s Opening Brief.

The Staff is apparently content to recommend the minimum 500-foot property line setback despite an industry standard specifying a safe setback of nearly twice that distance, and despite an admitted lack of knowledge concerning the maximum blade throw distance for a 100-

² The UNU Intervenors requested a meeting with Staff before issuance of the Staff Report to bring to their attention this guidance and other relevant information concerning safe setbacks, noise, and other Project-related issues and concerns. The Staff declined to meet with the UNU Intervenors. Siegfried, Tr. Vol. VIII 1816. However, the Staff met with the Applicant and its representatives a number of times leading up to the Staff Report. *Id.*; Doss, Tr. Vol. VIII 2077-78.

meter turbine. This is clearly inconsistent with Mr. Siegfried's representation that the Staff considered the worse-case impacts in their analysis. Siegfried, Tr. Vol. VIII 1829. Mr. Siegfried explained that the Staff made an "initial policy decision based on the minimum setback requirements," but noted that "additional information may be obtained." *Id.* It is astonishing that the Staff continues to cling to that "initial policy decision" despite the evidence at hearing indicating that the 500-foot setback is inadequate and potentially unsafe.

The same can be said about the Staff's reaction to the recommendation of turbine manufacturer Nordex that there normally must be at least 500 meters (1,640 feet) between a turbine and a residence. UNU Exh. 12. In its brief (at 24), the Staff dismisses that recommendation, reasoning that it presumes that the developer has not performed a site-specific noise or shadow flicker study. This is an unsubstantiated assumption, however; nowhere in the Nordex micro-siting guidance does it condition its recommendations in that fashion.³

Upon questioning by Applicant's counsel, Mr. Conway agreed that the formulas for blade shear and ice throw would be provided before the preconstruction conference, so there should be "no fear that the turbines will be built if they don't meet these standards." Conway, Tr. Vol. VIII 1996. This begs the question why Buckeye Wind did not produce that information by the time of the evidentiary hearing, two months after the Staff's request. As discussed in more detail below, it would be unlawful for the Board to defer consideration of this important siting information until after the conclusion of the evidentiary hearing and the issuance of a certificate. The Board should not approve the Project based upon setbacks proven at hearing to be unsafe. If the Board

³ For the record, the UNU Intervenors are not asking the Board to apply the recommended Nordex setback, as suggested by the Staff (Opening Brief at 24), because far greater setbacks are warranted to mitigate the harmful effects of wind turbine noise. The Nordex micro-siting guidance is significant because it is a glaring example of how Buckeye Wind, and even the Power Siting Board Staff, have overlooked industry standards in their determination to apply the bare minimum setbacks under law. UNU Intervenors' Opening Brief at IV.

believes additional information is necessary to determine adequate setbacks for blade shear and ice throw, the Board should reopen the evidentiary hearing on that issue to allow full participation of all parties of record in those deliberations.

E. The Applicant's Plans To Obtain An Incidental Take Permit Confirm The Project's Damage To The Indiana Bats In The Project Area, So The Board Needs To Take Actions Necessary To Protect The Bats And Their Habitat.

While Buckeye Wind admits (at 35) that endangered Indiana bats have been found less than one mile from the Project area, the Applicant misleadingly argues that its Habitat Conservation Plan and Incidental Take Permit will prevent the turbines from harming the bats. However, the Incidental Take Permit authorizes Buckeye Wind to kill and harm the bats. While the Habitat Conservation Plan may reduce the damage to some degree, it will not prevent this damage altogether. If no harm will befall the bats, no Incidental Take Permit would be necessary.

The same observation applies to Buckeye Wind's contention (at 36) that the Project "will not be an adverse impact" on the bats. The Applicant's quotes (at 36) from Cara Meinke state that the bats' preference for tree habitat "reduces" the risk, not eliminates it. And Ms. Meinke admitted during the hearing that Indiana bats forage in open areas such as fields, and, in fact, were tracked doing so during her survey in the former portion of the Project area located in Logan County. Moreover, if Buckeye Wind is accurate in its assertion (at 37) about the minimal acreage of trees to be destroyed in the Project, then it should have no objection to the conditions proposed in the UNU Intervenors' Opening Brief for protecting the bats' roost and maternity trees.

The UNU Intervenors refer the Board to their Opening Brief (at 61-67) for additional information rebutting Buckeye Wind's arguments on bats.

F. The Evidence Demonstrates That The Project Will Have An Adverse Effect On Aviation.

Evidence at hearing showed that the Project, if constructed, will have a significant adverse impact on aviation in and around the Project area. Two principal impacts would be (a) interference with emergency medical flights into and out of the Project area, and (b) hazards due to penetration of turbines into protected airspace.

John Holland testified that in certain weather conditions, CareFlight operations in the area of the Project could be delayed by as much as 6 to 8 minutes by the presence of 70 closely-grouped turbines. Holland, Tr. Vol. IX 2181; Urbana Exh. 6, Ans. 16. According to Mr. Holland, this would adversely affect the most critical component of CareFlight operations –speed -- in order to minimize the time to get patients to Level I trauma care. *Id.*, Ans. 20. The first hour after the accident is the most critical to the patient in determining survival or recovery time. *Id.*, Ans. 10. In situations where turbines prevent medical flights from landing at the accident site, it would be necessary to move the patient, resulting in further delay and potential further harm to the patient. *Id.*, Ans. 11.

The Staff has recommended a certificate condition prohibiting the construction of any turbine for which the FAA has made a presumed hazard finding or which does not meet the requirements of the Ohio Office of Aviation. Staff Exh. 2, Cond. 36. As of the conclusion of the evidentiary hearing, the Office of Aviation had recommended disapproval of eleven of the Project's 70 turbines due to the penetration of the turbines into protected airspace. Staff Opening Brief at 19. (The turbines in question are identified as Turbines 19, 29, 46, 48, 50, 57, 58, 60, 61, 62, and 63. *Id.*) Based on this recommendation of the Office of Aviation, the Board should deny approval of the turbines in question. For the following reasons, the Board should not defer the

approval or disapproval of any of the Project's turbines based on post-certificate determinations of the FAA or the Office of Aviation.

Revised Code § 4906.10(A)(5) provides that the Board may only issue a certificate upon a finding that the Project will comply with all rules and standards adopted under R.C. § 4961.32. Section 4906.10(A)(5) further requires the Board, in determining such compliance, to consult with the Office of Aviation under R.C. § 4561.341, which provides as follows:

Pursuant to any consultation with the power siting board regarding an application for certification under section 4906.03 or 4906.10 of the Revised Code, the office of aviation of the division of multi-modal planning and programs of the department of transportation shall review the application to determine whether the facility constitutes or will constitute an obstruction to air navigation based upon the rules adopted under section 4561.32 of the Revised Code. Upon review of the application, if the office determines that the facility constitutes or will constitute an obstruction to air navigation, it shall provide, in writing, this determination and either the terms, conditions, and modifications that are necessary for the applicant to eliminate the obstruction or a statement that compliance with the obstruction standards may be waived, to the power siting board under section 4906.03 or 4906.10 of the Revised Code, as appropriate.

As of the conclusion of the evidentiary hearing, the Office of Aviation recommended disapproval of Turbines 19, 29, 46, 48, 50, 57, 58, 60, 61, 62, and 63 for the reasons stated above. Staff Opening Brief at 19. There is no evidence that the Office of Aviation provided a written statement that compliance with the obstruction standards may be waived with respect to those turbines. Therefore, because the turbines in question violate the rules and standards of the Office of Aviation under R.C. § 4961.32, the Board may not issue a certificate for those turbines.

Buckeye Wind suggests (at 41) that the Board should defer to "FAA oversight in regards to aviation safety," citing *In re Columbus Southern Power Co.*, OPSB No. 06-0030-EL-BGN, Opinion, Order, and Certificate, April 23, 2007. However, in that case, the Ohio Office of

Aviation expressed no concerns whatsoever with the height of the project's structures. *Id.* at 12. Therefore, in the absence of evidence that the project would violate any rules or standards of the Office of Aviation, there was no legal impediment to certification of the project on those grounds. *See also, AMP-Ohio* at 16-17. Nonetheless, the Board prudently required the Applicant to file for necessary permits with the FAA. *Columbus Southern* at 12. *See also AMP-Ohio* at 13. This should not suggest, however, that the Board should defer to the FAA over the Ohio Office of Aviation concerning compliance with the rules and standards under R.C. § 4961.32. Furthermore, it would be contrary to R.C. § 4906.10(A)(5) for the Board to approve the siting of turbines shown to currently violate Office of Aviation standards, contingent on possible compliance with those standards or FAA regulations at some future time. *See Applicant's Opening Brief* at 42; *Staff Exh. 2, Cond. 36*. If, in the future, the Applicant can demonstrate that those turbines can comply with Office of Aviation standards, the Applicant should be required to apply for a certificate modification or a separate certificate, subject to all rights of public notice and participation under Chapter 4906 and the Board's rules.

G. The Weight of Evidence Demonstrates That the Project Will Adversely Affect Property Values.

The UNU Intervenors offered the expert testimony of Thomas Sherick concerning the likely impacts of the Project on neighboring real estate values. *Sherick Dir., UNU Exh. 22A*. Mr. Sherick has over 15 years of experience as a professional real estate appraiser, and is a Member of the Appraisal Institute. *UNU Exh. 22*. Members of the Appraisal Institute are practicing real estate appraisers who have met rigorous requirements (significantly above state and federal standards) relating to education, experience, and demonstrated knowledge and ability. *Sherick Dir., UNU Exh. 22A at 3*. Mr. Sherick is experienced in the review and analysis of a broad range of real property types, including commercial, mixed-use, and residential

development properties. *Id.* at 2. He is also experienced in the appraisal of individual residential properties. Sherick, Tr. Vol. VI 1290. He has regular professional experience with the Champaign County real estate market and was familiar with the character of eastern and central Champaign County prior to the preparation of his direct testimony. *Id.* at 1335; Sherick Dir., UNU Exh. 22A at 4.

Mr. Sherick testified that although the magnitude of the Project's impact on property values will vary depending on property type and proximity to turbines, the Project would likely reduce the value of vacant land by at least 6.5 % and the value of parcels with development potential by as much as 50%. In his opinion, home values in the vicinity of the Project would decrease at least 10%. Sherick Dir., UNU Exh. 22A at 15.

It is remarkable that Buckeye Wind attacks the credibility of Mr. Sherick because he relied upon hearsay information (at 49), when Buckeye Wind's own case on this issue depends so heavily on hearsay. Buckeye Wind offered no expert testimony on the subject of property value impacts. While Mr. Shears offered some vague opinions concerning the subject (Shears Dir., Applicant Exh. 1 A. 19), he is not a real estate professional and was not qualified as an expert on that subject. His testimony, and the report of Saratoga Associates that he "sponsored," are pure hearsay.

Mr. Sherick, on the other hand, was entitled to testify concerning property value even though his testimony was based in part on hearsay. *Masheter v. C. H. Hooker Trucking Co.*, 19 Ohio App.2d 169, 170 (5th App. Dist. 1969). His opinions were not based entirely or inordinately on hearsay, however. Rather, the information provided to him by realtor Patrick Hamilton assisted him in validating hypotheses he had already developed through his literature

review and his personal knowledge of analogous property value impacts from high voltage transmission lines (HVLTs). Sherick Dir., UNU Exh. 22A at 4.

Contrary to Buckeye Wind's contention (at 50), Mr. Sherick's opinions regarding Project-related negative market perception are not inconsistent with Ms. Johnson's recent purchase of 184 acres of undeveloped property next to her home. Ms. Johnson, as an existing resident in the Project area, had a significant incentive to acquire that property notwithstanding the announcement of the Buckeye Wind Project—to gain control of the adjacent property to prevent the siting of a wind turbine directly over her house. Those circumstances are different from those of an outside purchaser assessing properties in the Project area. Furthermore, any incentive for such “defensive acquisition” by existing residents in the Project area will evaporate if and when the Project is fully constructed.

Mr. Barce's perceptions of the real estate market in Benton County, Indiana are not probative of the likely property value impacts resulting from the Buckeye Wind Project. First, Mr. Barce admitted that he is not a real estate appraiser. Barce, Rebuttal Tr. Vol. II 2447-48. And for the reasons set forth in the UNU Intervenors' Opening Brief (at 77-78), Benton County is vastly different from Champaign County in terms of population density, population growth, economy, and residential characteristics and demand. Furthermore, more than 90% of rural landowners in Benton County have an economic interest in wind development in one form or another. *Id.*

In sum, the weight of evidence indicates that the Project, as currently proposed, will have a profound negative impact on the property values of landowners and homeowners in eastern and central Champaign County. This impact is not accounted for in either the Application or the Staff Report, but it should not be ignored. A project that would cause such dramatic impacts

would not serve the public interest, convenience, and necessity under R.C. § 4906.10(A)(6). For the reasons discussed in the UNU Intervenors' Opening Brief (at 78-79), any certificate for the Project should include property value mitigation in the form of a Property Value Protection Agreement.

III. ADDITIONAL PROTECTIONS ARE NECESSARY TO ENSURE ADEQUATE DECOMMISSIONING OF TURBINES.

At least with regard to Buckeye Wind and the Staff, the concerns and objections of the UNU Intervenors have largely fallen on deaf ears. On the subject of decommissioning, however, the UNU Intervenors recognize that the Staff and Buckeye Wind have both tried constructively to address some of their concerns. *E.g.*, Applicant's Opening Brief at 61-63; Staff's Opening Brief at 31. However, notwithstanding the acknowledged improvements in the decommissioning conditions as set forth in the briefs of the Staff and Buckeye Wind, the following additional protections are warranted:

1) There is no basis to conclude that either Buckeye Wind's or the Staff's recommended bond amount will be sufficient to cover decommissioning costs. The UNU Intervenors' concerns with the Staff's approach (no less than 25% of decommissioning costs in the case of a surety bond (Staff Opening Brief at 32)) are discussed in detail in the UNU Intervenors' Brief at 92-93. As long as Buckeye Wind is given the option of a surety bond for financial assurance, the Staff's 25% approach is not adequately protective because the Staff could not justify at hearing how that figure was likely to cover net decommissioning costs. *Id.*

Buckeye Wind shares the UNU Intervenors' concern that there is no basis for the Staff's 25% minimum bond approach. Applicant's Opening Brief at 60. However, Buckeye Wind's alternative proposal is equally unsupported. Buckeye Wind proposes to calculate the bond amount at decommissioning costs minus 75% of salvage value, claiming that this approach

provides a 25% safety factor as to fluctuations in scrap values. *Id.* at 60-61. However, Buckeye Wind provides no rationale as to why its alternate approach is any more appropriate than the Staff's.

Despite Buckeye Wind's assertion to the contrary (at footnote 25), UNU Exhibit 29 does indeed illustrate that historic scrap values have dropped by nearly 400% over periods as short as seven months. This evidence illustrates the inadequacy of Buckeye Wind's proposed alternative (which would only account for up to a 25% drop in salvage value).

John Stamberg testified that if a surety bond is to be required as decommissioning financial assurance, it should be set at twice the net decommissioning cost in order adequately to buffer against escalating demolition costs or fluctuating scrap values. Stamberg Dir., UNU Exh. 27A at 15. A more conservative approach would be to require a performance bond rather than offer it as an option. A performance bond would eliminate the need for decommissioning cost estimates and minimum bond values altogether. *Id.* at 14. Whichever approach the Board settles upon, however, must be determined to be adequate to protect against reasonably-anticipated fluctuations in net decommissioning costs.

2) If Buckeye Wind is permitted to use a surety bond for financial assurance, the bond must be payable to the Board. In its revisions to Condition M, the Staff has dropped its requirement that the bond be payable to the Board. Staff Opening Brief at 31. No reason is given for this change, although it may relate to the inclusion of an option for a performance bond. *Id.* However, if a surety bond remains an option for financial assurance, it is important that the bond be payable to the Board in order to facilitate the Board's effective enforcement of the decommissioning requirements. Stamberg Dir., UNU Exh. 27A at 16.

3) Financial assurance for decommissioning should be required upon commencement of construction, not in the first year of operation. While the UNU Intervenors have shown the wisdom of such an approach (UNU Intervenors’ Opening Brief at 98), neither the Staff nor Buckeye Wind have shown how that approach would impose “undue financial hardship” on Buckeye Wind. *E.g.*, Doss, Tr. Vol. IX 2097.

4) The Staff should be required to consult with the County Engineer in connection with the selection of an independent consulting engineer. The Staff states that it is not opposed to such consultation but that it does not believe such an additional condition is necessary. However, given the benefits of County involvement (UNU Intervenors’ Opening Brief at 95-96) and the apparent willingness of the Staff, there is no reason not to include such a requirement in the Certificate.

5) Buckeye Wind should be required to inform the Board prior to the expiration of its bond, in order to ensure it does not lapse. As discussed in UNU Intervenors’ Opening Brief (at 96-97), a bond will be of little use to the State or the host community if it is allowed to lapse before decommissioning is completed. The Board should ensure that a mechanism is in place to ensure that decommissioning is completed before lapse of the bond.

IV. CONDITIONS ALLOWING POST-CERTIFICATE ALTERATIONS, INFORMATION SUBMISSION, AND SIMILAR MEASURES WOULD UNFAIRLY UNDERMINE THE PURPOSE OF THE EVIDENTIARY HEARING AND RELIEVE BUCKEYE WIND OF ITS BURDEN OF PROOF.

Finally, the UNU Intervenors object to a number of the Staff’s recommended conditions that provide for post-certificate submission and approval of information about important aspects of the Project, or that require post-certificate measures that may alter the location of turbines. Such conditions include the following:

- (8) (e), (f), (h), (i), and (j): Post-certificate review of final electric collection system plan, tree clearing plan, geotechnical report, fire protection and medical emergency plan, and noise complaint resolution procedure;
- (14) Development and implementation of post-construction avian bat mortality survey plan approved by Staff and ODNR Division of Wildlife;
- (16) Development of Habitat Conservation Plan and receipt of Incidental Take Permit with regard to Indiana bats;
- (33) Post-certificate submission of maximum potential distance for blade shear event and formula used to calculate that distance;
- (36) Applicant is to meet all recommended and prescribed FAA and Ohio Aviation Office requirements to construct;
- (40) Post-certificate vertical Fresnel zone analysis;
- (46) Post-certificate submission of adjusted location for Turbine 57; and
- (50) Post-certificate identification of turbine model that has been selected.

Buckeye Wind has also proposed the following similar certificate conditions to which the UNU Intervenors object:

- (31) Post-certificate meeting between Applicant and Staff to discuss shadow flicker monitoring, testing, and remedies (Applicant's Opening Brief at 15);
- (45) Allows post-certificate relocation of Turbine 70 under certain conditions (*id.* at 16);
- (55) Requires notification of Staff as soon as turbine model is selected and submission of relevant information that would assure Staff that the turbine impacts would not exceed those associated with the three models listed in the Application (*id.* at 17).

The UNU Intervenors object to all of these conditions because they defer important Project information, siting considerations, and compliance/mitigation measures until after the Certificate is presumably issued. The Staff and Buckeye Wind would have the Board issue a certificate for this Project before all information relevant to R.C. § 4906.10(A) has been presented and considered. This is an administrative variant of the adage, “Shoot first, ask questions later.”

Such an approach poses significant problems on a number of levels. Several of the conditions (*e.g.*, 45, 46) would allow turbines to be relocated after the Certificate is issued, based on information not presented at the public information meeting, in the Application, or at the hearing. In other cases, the conditions defer steps (such as the Habitat Conservation Plan and Incidental Take Permit) that should be taken before a Certificate is issued for the Project, since the deferred steps may affect the configuration of the Project and the siting of turbines. A significant number of these conditions (*e.g.*, 8, 14, 16, 31, 33, 40, 50, 55) allow for deferral of important information on key issues—project design, shadow flicker, noise, and impacts on wildlife, aviation, and telecommunications--that were debated at length by the parties and witnesses at the evidentiary hearing.

If this is to be allowed, it calls into question the purpose and the fairness of the three-week hearing in which all of the intervenors participated at considerable cost and effort. These conditions would relieve Buckeye Wind of its burden of proof in the evidentiary hearing, would permit the arbitrary circumvention of the rights of public notice and participation set forth in R.C. Chapter 4906, and would deprive the intervenors of procedural due process. For these reasons, the Board should not approve the above-referenced conditions as post-certificate requirements. Rather, the Board should require that all of the measures in question be

completed, submitted, and/or approved prior to certification. Furthermore, the evidentiary hearing should be reopened as appropriate to allow for full evidentiary exchange by all parties regarding all of this new information.

V. CONCLUSION

The Staff has observed, “Because of the magnitude of this project and the potential impacts in and around the proposed project area, the implementation of mitigation and, when possible, avoidance measures is critical to minimize impacts.” Staff’s Opening Brief at 14. Yet despite professing to be receptive to new information, in the end the Staff has ignored reasonable mitigation and possible avoidance measures, deferring to whatever the Applicant wants to do.

The Board should not issue a Certificate based on the current state of the Application, because it contains inadequate information to provide an informed basis for the Certificate.

These deficiencies include the following:

- Lack of credible information about the distance that wind turbines can throw ice.
- Lack of credible information about the distance that wind turbines can throw their blades.
- The background noise study uses erroneous techniques to calculate background noise and must be redone, or the Application must use the results of Richard James’ background sound measurements.
- The noise model fails to account for the five dBA margin of error in modeling, and has other errors described in the UNU Intervenors’ opening and reply briefs, and must be revised to make it accurate.
- The noise model must identify the wind turbines that are line sources, and recalculate the noise impacts from those turbines.

- Lack of information to quantify the air emissions that the Project's wind energy would avoid by replacing electricity from coal-fired power plants, including lack of information about the emission factor used to calculate emissions from the coal-fired power plants, the energy mix of power sources that will be displaced by the Project, and the wind data and other information needed to calculate the Project's capacity factor.
- A quantification of the taxes that the Project will pay, to substantiate Buckeye Wind's claims about the economic benefits of the Project.
- Inadequate information about bird and bat populations in the Project area due to limited surveys.
- Not including the information and deliverables listed in Section IV of this reply brief.

In light of these deficiencies, the Board should return the Application to Buckeye Wind for supplementation and reopen the hearing record to consider the new information provided in the amended application.

If the Board decides to issue a Certificate despite the Application's inadequacy, it should include the following conditions in the Certificate to protect the public in addition to any others that are requested in the UNU Intervenors' opening and reply briefs:

- The Applicant shall not allow any turbine to rotate when ice is on any of its blades.
- The sound level from the turbines shall not exceed 34 dBA at the property line of any property owned by a person whose land is not being occupied by turbines in the facility.

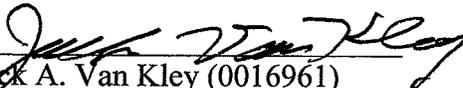
Where sound levels are greater than 34 dBA, the Applicant shall submit a mitigation plan for Staff review and approval to reduce sound levels below 34 dBA, and shall implement the mitigation plan as approved.

- The dBC operating immissions (as L_{Ceq}) for turbine noise at the receiving property line of a person whose land is not being occupied by turbines in the facility shall not be more than 20 dB above the measured dBA (as L_{A90}) pre-construction long-term background sound level + 5 dB.
- The Applicant shall not construct any wind turbine closer than 1.25 miles from the property line of any property owned by a person whose land is not being occupied by turbines in the facility. The Applicant shall submit a report to the Staff identifying the wind turbines that are line sources, and shall not construct any line source wind turbine closer than 2.0 miles from the property line of any property owned by a person whose land is not being occupied by turbines in the facility.
- The Applicant shall not install any model of wind turbine that produces more noise than the Repower MM92 turbine model that was evaluated in the Applicant's noise model.
- The approved turbines are subject to mitigation after construction, up to and including removal, if they exceed 10 hours per year of shadow flicker at any non-participating receptor, including homes, other buildings, and land, owned by a person whose land is not being occupied by turbines in the facility.
- The Staff shall investigate any complaint about noise, shadow flicker, or other issues that it receives about the facility and address any meritorious complaints. Upon the Staff's request, the Applicant shall provide the Staff with the funding necessary to retain and pay the Staff's own consultant to investigate any complaint about noise, shadow flicker, or other issue that the Board or the Applicant has received about the facility and to identify solutions to any complaints that the Staff determines to have merit. The Applicant shall implement any such solutions to resolve the complaints.

- The Applicant shall forward a detailed record of each complaint about noise, shadow flicker, or other issues it has received about the facility to the Staff and a description of the measures taken to address the complaint.
- Due to aviation hazards, the Applicant shall not construct turbines 19, 29, 46, 48, 50, 57, 58, 60, 61, 62, and 63.
- The conditions in the Certificate should contain the revisions and additions to the provisions for protecting Indiana bats described on pages 62-67 of the UNU Intervenors' opening brief.
- The Applicant shall not cut down or harm any trees in which bats have been known to roost or nest.
- The Applicant shall offer the attached Property Value Protection Agreement (currently attached as Exhibit A to the UNU Intervenors' opening brief) to all nonparticipating landowners within three-quarters mile of any turbine and shall enter into this agreement with any such landowner who consents to the agreement.
- No cameras shall be mounted on any turbines.
- The Applicant shall provide a bond to Champaign County adequate to reimburse the county for damage to roads caused by construction of the Project.
- The conditions in the Certificate should contain the revisions and additions to its decommissioning requirements described on pages 91-98 of the UNU Intervenors' opening brief.

The UNU Intervenors appreciate the time that the ALJs, and soon, the Board, will spend considering the issues raised in the parties' submissions, and urge them to issue a Certificate that adequately protects the community.

Respectfully submitted,



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CERTIFICATE OF SERVICE

I hereby certify that, on February 1, 2010, a copy of the foregoing Post-Hearing Reply

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**BEFORE
THE OHIO POWER SITING BOARD**

**In the Matter of the Application of)
Buckeye Wind LLC for a Certificate)
to Install Numerous Electricity)
Generating Wind Turbines in)
Champaign County to be Collected at)
an Electrical Substation in)
Union Township,)
Champaign County, Ohio)**

Case No. 08-666-EL-BGN

**POST-HEARING REPLY BRIEF OF INTERVENORS
UNION NEIGHBORS UNITED, INC., ROBERT AND
DIANE MCCONNELL, AND JULIA F. JOHNSON**

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TABLE OF CONTENTS

I. INTRODUCTION.....1

II. BUCKEYE WIND HAS FAILED TO MEET ITS BURDEN TO PROVE THAT IT IS ELIGIBLE FOR A POWER SITING CERTIFICATE UNDER R.C. § 4906.10(A)2

A. In Addition To The Other Gaps And Flaws In Buckeye Wind’s Evidence Concerning The Public Benefits Of The Project, The Governor’s Initiative To Eliminate The Utility Personal Property Tax For Wind Power Shows That The Economic Benefits Of The Project Are Far From Certain4

B. The Noise From The Buckeye Wind Project As Proposed Will Cause Serious Discomfort, Sleep Deprivation, And Health Problems6

1. The Applicant Has Not Produced Any Credible Evidence That It Is Unable To Redesign The Project In A Manner That Preserves Its Profitability While Protecting The Health And Comfort Of Nonparticipating Neighbors.....6

2. The Project Is Not Designed To Prevent Noise Impacts Widely Regarded By The Acoustical Engineering And Medical Fields As Threats To The Public’s Health And Comfort.....7

3. Buckeye Wind’s Predictions Of Turbine Noise Levels Are Anything But “Conservative”18

4. The Board’s Prior Decisions On Dissimilar Facilities And The Staff’s Position In The Instant Case Provide No Meaningful Guidance For Controlling Wind Project Noise18

5. The Certificate Needs To Have An Enforceable Noise Limit That Provides Clarity On The Standard To Be Met27

6. The Complaint Resolution Procedure Should Be Modified To Make It Meaningful.....29

C. Shadow Flicker Is Indisputably A Nuisance Impact Of The Project That Warrants Effective Mitigation.....31

D. The 500-Foot Minimum Setback Recommended By Staff Has Been Proven At Hearing To Be Inadequate To Protect Neighboring Properties From The Hazards of Blade Shear And Ice Throw32

E.	The Applicant’s Plans To Obtain An Incidental Take Permit Confirm The Project’s Damage To The Indiana Bats In The Project Area, So The Board Needs To Take Actions Necessary To Protect The Bats And Their Habitat..	35
F.	The Evidence Demonstrates That The Project Will Have An Adverse Effect On Aviation.....	36
G.	The Weight of Evidence Demonstrates That the Project Will Adversely Affect Property Values	38
III.	ADDITIONAL PROTECTIONS ARE NECESSARY TO ENSURE ADEQUATE DECOMMISSIONING OF TURBINES.....	41
IV.	CONDITIONS ALLOWING POST-CERTIFICATE ALTERATIONS, INFORMATION SUBMISSION, AND SIMILAR MEASURES WOULD UNFAIRLY UNDERMINE THE PURPOSE OF THE EVIDENTIARY HEARING AND RELIEVE BUCKEYE WIND OF ITS BURDEN OF PROOF.....	43
V.	CONCLUSION	46
•	CERTIFICATE OF SERVICE 51 The conditions in the Certificate should contain the revisions and additions to its decommissioning requirements described on pages 91-98 of the UNU Intervenors’ opening brief.	

TABLE OF AUTHORITIES

CASES

Ohio:

Diversified Mortg. Investors, Inc. v. Athens County Bd. of Revision,
7 Ohio App.3d 157 (4th Dist. 1982)21

Erdeljohn v. Ohio St. Bd. of Pharmacy, 38 Ohio Misc.2d 1 (Hamilton Cty. 1987)3

Haley v. Ohio St. Dental Bd.,7 Ohio App.3d 1 (1982)3

Masheter v. C. H. Hooker Trucking Co., 19 Ohio App.2d 169 (5th App. Dist. 1969).....39

NorthPoint Properties, Inc. v. Petticord, 179 Ohio App.3d 342 (8th Dist. 2008).....20

Orange City School Bd. of Ed. v. Cuyahoga Cty. Bd. of Revision,
74 Ohio St.3d 415 (1996)2

Sinclair v. Sinclair, 182 Ohio App.3d 691 (4th Dist. 2009)21

Administrative:

In re American Municipal Power-Ohio, Inc., Case No. 06-1358-EL-BGN,
Opinion, Order, and Certificate, Mar. 3, 2008.....19, 30, 38

In re American Municipal Power-Ohio, Inc., Case No. 06-1358-EL-BGN,
Entry on Rehearing, April 28, 2008.....2, 3

In re Aquila Fulton County Power, LLC, Case No. 01-1022-EL-BGN,
Opinion, Order, and Certificate, May 20, 200219, 22

In re Columbus Southern Power Co., OPSB No. 06-0030-EL-BGN
Opinion, Order, and Certificate, April 23, 200737, 38

In re Duke Energy Hanging Rock, LLC, Case No. 01-175-EL-BGN,
Opinion, Order and Certificate, Sept. 17, 200121

In re Fremont Energy Center, LLC, Case No. 00-1527-EL-BGN,
Opinion, Order, and Certificate, May 21, 200128

In re PG&E Dispersed Generating Co., Case No. 00-922-EL-BGN,
Opinion and Order, Feb. 12, 200119, 21, 28

STATUTES

R.C. § 4961.3237

R.C. § 4561.34137

R.C. § 4906.102, 37, 38, 45

RULES

O.A.C. § 4906-7-092

I. INTRODUCTION

Buckeye Wind opens its brief with the bold claim that it has “presented a Facility designed in accordance with good industry practice and intended to minimize adverse impacts.” Applicant’s Brief at 2. Quite to the contrary, the Buckeye Wind Project (“Project”) has not been designed in accordance with good industry practices. In fact, Buckeye Wind ignored the setback recommendations of its preferred turbine manufacturer, Nordex, and other “safe distance” standards that are based on recognized industry practices. *E.g.*, UNU Exh. 11, 13. Nor is the Project designed to minimize adverse impacts. As discussed in the UNU Intervenors’ Opening Brief, the noise modeling supporting Buckeye Wind’s proposed setbacks is badly flawed. Even where Buckeye Wind proposes noise and shadow flicker “design goals” to avoid what it admits are unacceptable impacts on neighboring properties, it then ignores those design goals in siting its turbines. In fact, although the Application claims to strike “a sensible balance between the interests of all parties” that allows viable wind projects to be sited while avoiding noise “so loud that it leads to legitimate disturbance at a large number of homes” (Applic. at 93), Buckeye Wind has sited its turbines so densely as to subject more than 1,000 homes to wind turbine noise in excess of Buckeye Wind’s own design goal. UNU Exh. 43 at 5, Int. 12; Hessler, Tr. Vol. III 855-56. These are hardly “good industry practices.” Rather, Buckeye Wind seeks to cram as many wind turbines as possible into the rural residential communities of eastern Champaign County.

Buckeye Wind also disparages the involvement of the UNU Intervenors as the efforts of a “vocal . . . small citizen group” whose goal is “to keep the Facility out of Champaign County.” Applicant’s Opening Brief at 2. While Buckeye Wind understandably seeks to divert attention from the serious problems with its Project, the UNU Intervenors’ involvement in this case has

been reasonable and has contributed compelling evidence concerning the errors and flaws in the Application and the impacts of the Project. Despite Buckeye Wind's dismissal of the UNU Intervenors as a "small citizen group," neither Buckeye Wind nor the Board can ignore the outpouring of community concern about the Project, as reflected in the transcript of the public hearing and in the docket of this case. As Buckeye Wind itself acknowledged, half of the four hours of testimony at the August 28, 2009 public hearing was in opposition to the Project. Applicant's Opening Brief at 6. Since Buckeye Wind revealed the proposed locations of its turbines, the majority of public opinion has swung against the Project. Johnson, Tr. Vol. V 1189. To lightly dismiss the level of community concern about this Project shows inexcusable arrogance on the part of Buckeye Wind.

II. BUCKEYE WIND HAS FAILED TO MEET ITS BURDEN TO PROVE THAT IT IS ELIGIBLE FOR A POWER SITING CERTIFICATE UNDER R.C. § 4906.10(A).

Buckeye Wind's responsibility in this hearing is more than merely to "defend its application." Staff Opening Brief at 9. Buckeye Wind, by its own admission, has the burden of proof to demonstrate that its Project meets all of the criteria of R.C. § 4906.10(A). Applicant's Opening Brief at 3. Although Buckeye Wind claims it has done so (*id.*), its case was based largely on information in its Application that was not supported at hearing by the testimony of a live witness with knowledge or expertise. UNU Intervenors' Opening Brief at VII(F).

Admittedly, administrative agencies are not generally bound by the Ohio Rules of Evidence. *Orange City School Bd. of Ed. v. Cuyahoga Cty. Bd. of Revision*, 74 Ohio St.3d 415, 417 (1996). The Board has specifically ruled that O.A.C. § 4906-7-09 authorizes hearing examiners to admit evidence that would otherwise be inadmissible under a strict reading of the Rules of Evidence. *In re American Municipal Power-Ohio, Inc.*, Case No. 06-1358-EL-BGN,

Entry on Rehearing, April 28, 2008. Nonetheless, although the hearsay rule may be relaxed in Board proceedings, the discretion of an agency to consider hearsay cannot be exercised arbitrarily. *Haley v. Ohio St. Dental Bd.*, 7 Ohio App.3d 1 (1982); *Erdeljohn v. Ohio St. Bd. of Pharmacy*, 38 Ohio Misc.2d 1 (Hamilton Cty. 1987).

Much of Buckeye Wind's case is based entirely on hearsay evidence in the Application. This includes its assertions on environmental benefits and impacts, aesthetic impacts, shadow flicker, blade throw, ice shedding, and socioeconomic benefits (including property value impacts). *E.g.*, Applic. Exhs. I (Visual Impact Assessment), L (Shadow Flicker Study), R (Socioeconomic Report), U (Cultural Resources Report), V (Communication Studies), W (Route Evaluation Study). Although Mr. Shears "sponsored" the Application as evidence, he was not qualified as an expert on any of these topics, did not personally prepare the portions of the Application on those topics, and admitted lack of knowledge concerning some of them. UNU Intervenors' Opening Brief at 113. As discussed in Section VII(F) of the UNU Intervenors' Opening Brief, those portions of the Application that were unsupported by a witness with personal knowledge are pure hearsay. Where Buckeye Wind has relied so extensively on hearsay in support of its case, it cannot fairly be deemed to have carried its burden of proof, notwithstanding the relaxed hearsay standard in Board proceedings. *Cf. Erdeljohn*, 38 Ohio Misc.2d at 3-4 ("The virtually exclusive use of hearsay and inferences thereon found in this case has . . . denuded the significant evidence of any probative value and further demonstrates arbitrariness in an extreme degree.").

Furthermore, it was inequitable to allow Buckeye Wind to introduce volumes of unsupported hearsay, while the intervenors were required to produce live witnesses. In her rulings on the admissibility of Dr. Michael Nissenbaum's deposition transcript, expert report,

and affidavit, the ALJ made it abundantly clear that expert testimony would not be accepted unless the witnesses were personally present at the hearing for purposes of cross-examination. Entry, Oct. 21, 2009, at 3; Tr. Vol. VII 1633-34; UNU Intervenors' Opening Brief at VII(D), pp. 105-107. Witnesses were not even permitted to testify telephonically at the hearing. Tr. Vol. VII 1633-34. Moreover, the fact that Dr. Nissenbaum's affidavit was excluded from the record of the public hearing further indicated that the ALJs did not intend to allow hearsay evidence, even if under oath. UNU Intervenors' Opening Brief at VII(D), pp. 105-107.

Had the UNU Intervenors known that reports, articles, data and analyses would be admitted as hearsay without supporting expert testimony at the hearing, the UNU Intervenors could have, and would have, offered additional documentary evidence on a wide range of relevant topics. It is highly prejudicial to all of the intervenors to allow Buckeye Wind the opportunity to offer unsupported hearsay evidence through the Application, but to deny that same opportunity to the intervenors. For these reason, the Board should reconsider and grant the UNU Intervenors' motion to strike the hearsay evidence set forth in the Application and in the testimony of Mr. Shears. UNU Intervenors' Opening Brief at VII(F), pp. 108-114. In the alternative, the Board should admit the testimony of Dr. Michael Nissenbaum (UNU Exh. 66) and reopen the evidentiary hearing for the consideration of hearsay evidence to be offered by the Intervenors.

A. **In Addition To The Other Gaps And Flaws In Buckeye Wind's Evidence Concerning The Public Benefits Of The Project, The Governor's Initiative To Eliminate The Utility Personal Property Tax For Wind Power Shows That The Economic Benefits Of The Project Are Far From Certain.**

In their Opening Brief, the UNU Intervenors explained in detail how Buckeye Wind's claims of public and environmental benefit were unsupported by reliable evidence and that the

overall impact of the Project on Champaign County would be decidedly negative. UNU Intervenor's Opening Brief at III, IV.

Buckeye Wind asserts that the Project will help the State meet its renewable energy goals under S.B. 221. Applicant's Opening Brief at 2-3. However, there is no reliable evidence in the record as to the amount of energy the Project will ever generate. On cross-examination, Mr. Shears' responses about the Project's capacity factor were vague and evasive, and the UNU Intervenor's were barred from pursuing that issue further on cross-examination. UNU Intervenor's Opening Brief at 12. Furthermore, Buckeye Wind's claims of leaseholder payments (Applicant's Opening Brief at 2-3) were entirely unsupported by live testimony and should be disregarded as hearsay for the reasons discussed above.

The Staff has noted the potential tax benefits of the Project. Staff Opening Brief at 32. However, there is no factual or legal basis to quantify the local taxes that would be generated by the Project. Nowhere in the record is there any evidence concerning the percentage of Project leaseholders that reside inside or outside of Champaign County. And in his State of the State Address delivered on Tuesday, January 26, 2010, Governor Strickland announced that he will seek the elimination of the tangible personal property tax for wind energy facilities:

With the federal tax credit currently in place for renewable energy, companies will be making commitments to new facilities in the coming months. But the fact of the matter is that Ohio's tax structure discourages wind and solar companies from coming to Ohio to generate renewable energy.

We should give those companies every reason to choose Ohio. That's why I am asking the legislature to erase Ohio's tangible personal property tax on generation for wind and solar facilities that break ground this year, create Ohio jobs, and begin producing energy by 2012.

In light of this announcement, any projections of tax generation from the Project are totally speculative.

In the end analysis, Buckeye Wind has proven that it will generate only twelve jobs long-term jobs—and not all of them will be based in Champaign County or even in Ohio. Shears, Tr. Vol. I 62. That is the sum total of the reliable and admissible evidence in the record concerning the economic benefits of the Project. Balanced against the substantial evidence of potential impairment of local property rights, loss of property value, and other impacts (UNU Intervenors' Opening Brief at 1, 71-86), the record in this case shows that the Project will be an overwhelming net detriment to Champaign County and to the State of Ohio, and will not serve the public interest, convenience, and necessity from the standpoint of socioeconomic impacts.

B. The Noise From The Buckeye Wind Project As Proposed Will Cause Serious Discomfort, Sleep Deprivation, And Health Problems.

1. The Applicant Has Not Produced Any Credible Evidence That It Is Unable To Redesign The Project In A Manner That Preserves Its Profitability While Protecting The Health And Comfort Of Nonparticipating Neighbors.

Buckeye Wind's statements that it cannot construct its wind project unless the Board allows the wind turbines within 914 feet of neighboring homes and within 590 feet of nonparticipants' land are the pinnacle of arrogance. In essence, the Applicant is telling the Board it must approve the Project as Buckeye Wind wishes to design it, even if the Board, as it should, finds that this design unfairly burdens the community with unwelcomed damage to health and comfort. The Board should assert its authority, as provided in R.C. Chapter 4906, to require Buckeye Wind to properly site its wind turbines.

While Buckeye Wind argues that the UNU Intervenors have requested a 1.25 setback as a ploy to block the Project, this setback is based solely on the distance it will take to reduce wind turbine noise to acceptable levels. UNU's members are not opposed to wind power and, unlike

other Champaign County residents, have not placed “No Wind Turbines” signs in their yards. Johnson, Tr. Vol. V 1187. They merely and justifiably want setbacks that protect them, their land, and their homes. *Id.* at 1187-88. If Buckeye Wind has designed its Project in such a way as to site its turbines too close to other persons’ homes and land, that is its fault, not the Board’s or the intervenors’ doing. If Buckeye Wind intends to cram 70 wind turbines into a crowded county, it should at least engage in responsible siting.

Moreover, there is no evidence that Buckeye Wind is unable to site a wind farm in Champaign County if it does the task responsibly. As explained in the UNU Intervenors’ Opening Brief (at 58), Buckeye Wind has not shown that it is unable to substitute other potential turbine sites for those in its current design that are too close to neighboring properties. No witness, not even Buckeye Wind’s paid witnesses, have testified that Buckeye Wind would be unable to successfully redesign its Project in a way that preserves its profitability while preventing undue damage to the community.

Furthermore, while Mr. Hessler asserts that no wind projects can be sited east of the Mississippi River with a 1.25 mile setback, he presented no studies, no maps, no reports, or any other documentary evidence to support that bald allegation. If this amazing assertion were true, surely some evidence of its truth exists. On the other hand, Mr. Hessler’s ignorance of the existence of wind projects as prominent and nearby as those in Benton County, Indiana demonstrates that he has no basis to make that assertion.

2. **The Project Is Not Designed To Prevent Noise Impacts Widely Regarded By The Acoustical Engineering And Medical Fields As Threats To The Public’s Health And Comfort.**

Buckeye Wind characterizes (at 19, fn. 6) its noise consultant, David Hessler, as an experienced acoustical engineer and then praises his work on the Project. However, Mr.

Hessler's work on this Project is anything but credible. First, he set five dBA over background, i.e., 34 dBA at night) as the "design goal" for the Project, realizing that this is the usual accepted standard in acoustical engineering for protecting the community from new noise sources.

However, he discovered that numerous homes (at least 1004 of them) will be exposed to noise increases higher than this level, even after skewing his model to predict lower noise impacts.

So then Mr. Hessler drastically lowered the design goal to 40 dBA, which Buckeye Wind's brief (at 22) characterizes as a "working goal." However, Mr. Hessler could not even accomplish this lenient "working goal." Buckeye Wind's brief admits (at 23) that noise levels at as many as 30 nonparticipating residences are predicted to exceed 40 dBA during daytime at a wind speed of six meters per second. Buckeye's brief further admits (at 23) that five nonparticipating residences may be exposed to levels higher than 40 dBA at night, when the occupants are trying to sleep. Having set such a lenient goal, Buckeye Wind then argues that it only slightly exceeds that already meaningless goal by one or two dBA. Then, not having met his liberal 40 dBA goal, Mr. Hessler suggested that 45 dBA be set as the new standard, calculated as a meaningless Leq average. Hessler Rebuttal Dir., Applicant Exh. 26, Ans. 13. Buckeye Wind's design goal is not based on any acoustical or health standard, but is solely based on what Buckeye believes it can achieve without redesigning the Project.

As explained in the UNU Intervenors' Opening Brief (at 36-45), a 40 dBA goal, even if achieved, will not protect the community's health, sleep, and comfort. Mr. Hessler mischaracterizes the 2009 WHO guideline of 40 dBA as "essentially a design goal with an interim target of 55 dBA." However, WHO has made it clear that achieving a noise limit of 40 dBA will not prevent sleep disturbance (*see, id.*), including the 1999 WHO recommendation of 30 dBA as the limit for "a good night's sleep." UNU Exh. 49 at 22. Moreover, the WHO has

emphasized that the 55 dBA “interim target” that Mr. Hessler misleadingly cites will not protect public health and should be considered only where lower levels are infeasible in the short-term, in which case it may be used temporarily “for exceptional local situations.” Applicant Exh. 18 at XVIII. While Buckeye Wind compares 40 dBA of wind turbine noise to 50 to 60 dBA of conversational speech, the two are not analogous due to the annoying characteristics of wind turbine noise. Furthermore, few people can tolerate conversations in their bedrooms when they are trying to sleep. Moreover, as explained in the UNU Intervenors’ Opening Brief (at 49-53), the low frequency noise from turbines is not diminished by passing through residence walls and roofs, and may even increase inside the home due to resonance.

Although Buckeye Wind promotes Kenneth Mundt’s testimony as evidence that wind turbine noise does not cause health effects, Dr. Mundt’s testimony was at best, meaningless, and at worst, misleading. Apparently, Dr. Mundt made an attempt to cherry-pick the literature he reviewed for his opinions, since he ignored the 1999, 2007, and 2009 WHO reports that provide the most definitive information about the health effects of noise. These reports directly and conclusively contradict Dr. Mundt’s statements that there is no causative link between noise and health problems. While Dr. Mundt opined about the adequacy of the short setbacks proposed for the Project, he lacks the acoustical engineering credentials necessary to express such an opinion. Mundt, Tr. Vol. II 452 (admitting he has no training in acoustics). While Buckeye Wind mentions (at 30) Dr. Mundt’s observation that a high school in his state is located directly under a wind turbine, even Don Bauer, a non-expert, recognized that little noise can be heard directly under a wind turbine. Bauer, Tr. Vol. IV 1046; *See also*, James Dir., UNU Exh. 31A, Ans. 67.

Part of the disconnect between Dr. Mundt’s testimony and the findings of the worldwide experts who, unlike Dr. Mundt, are familiar with wind project acoustics, appears to result from

the semantics that he employed in his testimony. Dr. Mundt was careful to limit his opinion to health effects that literature has proven result directly from noise. Mundt Dir., Applicant Exh. 6, Ans. 22. Dr. Mundt does not classify sleep deprivation as a health effect. Mundt. Tr. Vol. II 460. Although he admitted that sleep deprivation can lead to health problems (*id.* at 467, 469, 472-73), he did not evaluate those health problems. That is, he focused narrowly on health problems caused directly by noise.

Rather than focusing on sleep deprivation, the most common health problem from wind project noise, Dr. Mundt testified that the Minnesota Department of Health survey found little evidence that wind turbine noise directly activates the vestibular and autonomic nervous system. Mundt, Tr. Vol. II 541-42. The UNU Intervenors have expressed no opinion in this proceeding as to whether wind turbine noise causes nausea, vomiting, cardiac arrhythmia, and other health effects by disturbing the vestibular system with vibration or sounds entering the head through pathways other than the ear openings. See UNU Exh. 49 at 8, describing the effects of vibrations and other disturbance of the vestibular system. Instead, the UNU Intervenors have focused on the undeniable health problems caused by the sleep deprivation resulting from wind turbine noise. Buckeye Wind's brief (at 31-32) also attempts to divert attention from sleep deprivation and its health impacts by focusing on the vestibular system. This is a mere straw man argument to draw the Board's attention away from the most common health effects resulting from noise-induced sleep deprivation.

While Buckeye Wind argues that Dr. Mundt was the only expert to testify about the health effects of wind turbine noise, his testimony is all that is needed to prove the adverse health impacts of noise. In Dr. Mundt's testimony, he admitted:

- According to a study by Dinges and Banks, whose report he utilized for his opinion, restricting sleep below a person’s optimal time in bed can cause a range of neurobehavioral deficits, including lapses of attention, slowed working memory, reduced cognitive throughput, depressed mood, and perseveration of thought. UNU Exh. 46 at 519 (abstract); Mundt, Tr. Vol. II 471-72. Even the continued restriction of sleep to less than seven hours per night may cause significant daytime cognitive dysfunction. UNU Exh. 46 at 519 (abstract) and 526; Mundt, Tr. Vol. II 473. Reduced sleep is associated with cardiovascular morbidity, traffic accidents, and death. UNU Exh. 46 at 526; Mundt, Tr. Vol. II 476. Dr. Mundt agreed with the foregoing conclusions. *Id.* at 471-73, 476.
- Dr. Amanda Harry found adverse health symptoms up to a mile from wind turbines, including sleep disturbance, headaches, palpitations, stress, anxiety, depression, vertigo, and tinnitus. UNU Exh. 44 at 21, 30; Mundt Dir., Applicant Exh. 6 at 10.
- A study by the National Research Council of the National Academies of Science found that “to the extent that wind-energy projects create negative impacts on human health and well-being, the impacts are experienced mainly by people living near wind turbines who are affected by noise and shadow flicker.” UNU Exh. 45 at 107; Mundt, Tr. Vol. II 464-66.
- Dr. Michael Nissenbaum has found that 14 of 15 neighbors living within 1200 to 3400 feet of the Mars Hill wind project have experienced health effects such as sleep disturbance, headaches, dizziness, weight changes, tinnitus, and hypertension. *Id.* at 530-33; UNU Exh. 51.

- A study by Eja Pedersen found that 16% of the persons exposed to wind turbine noise above 35 dBA were afflicted by sleep disturbance. Mundt, Tr. Vol. II 483-84; UNU Exh. 47 at 3467.
- According to the WHO, as described in a survey by the Minnesota Department of Health, a large proportion of low frequency noise in wind turbine sound “may increase considerably the adverse effects on health.” UNU Exh. 49 at 20; Mundt., Tr. Vol. II 504. The same survey recited a WHO recommendation that noise be limited to 30 dBA for a “good night’s sleep.” *Id.* at 506; UNU Exh. 49 at 22. Despite the obvious relevance of the WHO statements discussed in the Minnesota survey, Dr. Mundt chose not to mention the WHO report in his direct testimony. Mundt, Tr. Vol. II 504.

Dr. Mundt’s opinions suffer from another malady. As an epidemiologist, he proclaims to believe that, until the epidemiological literature discusses a direct link between wind turbine noise and health problems, it must be assumed not to exist. Mundt Dir., Applicant Exh. 6 at Ans. 22. This is the same ploy that experts employed by the tobacco companies used for decades to dispute the causal link between smoking and cancer. Mundt, Tr. Vol. II 548-49 (admitting that “for decades the tobacco companies claimed that there [were] no demonstrative adverse health effects caused by smoking tobacco in the epidemiological studies”). As Dr. Mundt admitted, the lack of literature of this description does not mean that there is no link. Mundt, Tr. Vol. II 463. It just means no one has written on it yet using methodology approved by epidemiologists, or that epidemiologists have cherry-picked the literature to support their views, just as Dr. Mundt did when he ignored WHO’s reports. Nevertheless, based on that slender logic, Dr. Mundt opines that no setbacks are necessary to protect the health of the community from wind project

noise. Mundt Dir., Applicant Exh. 6, Ans. 22. However, since ample literatures shows a direct link between wind turbine noise and sleep disturbance, and ample literature shows a direct link between noise and health problems, it is irresponsible to pretend that no setbacks are needed to prevent health impacts from wind turbine noise.

Apparently realizing the deficiencies in Dr. Mundt's testimony, Buckeye Wind pretends (at 32-33) that Christopher Shears is an expert on the health impacts of wind turbine noise (among his many other areas of expertise, according to the Applicant). Mr. Shears thinks there are only a "handful of possible cases" of health impacts that have been raised. Apparently, Mr. Shears has not visited Mars Hill, Maine to learn about the sleep disturbance, headaches, dizziness, weight changes, and other health problems experienced by the neighbors of that wind project. Mundt, Tr. Vol. II 530-34; UNU Exh. 51. Nor apparently has he talked to the residents near the wind project in Illinois where Rene Taylor resides, and whose family has suffered sleep deprivation, headaches, irritability, ear pressure, fatigue, and heart palpitations. Taylor Dir., UNU Exh. 65 at 3. And, apparently, he is not familiar with the wind turbines found by Dr. Amanda Harry to be causing sleep disturbance, headaches, palpitations, stress, anxiety, depression, vertigo, and tinnitus. UNU Exh. 44 at 21, 30; Mundt Dir., Applicant Exh. 6 at p. 10. Evidently, he has not read the literature that Dr. Mundt reviewed for his opinions, as well as the WHO reports that Dr. Mundt attempted to sweep under the rug.

Buckeye Wind argues (at 33) that Larry Wunsch did not testify about any health problems he has experienced. That is true, but pointless. Not everyone exposed to loud noise is affected the same way and not everyone will suffer health maladies from bothersome noise. Buckeye Wind also states (at 34) that Mr. Wunsch opposed the turbines before construction, and

people report more symptoms when upset about something. However, one need only listen to Mr. Wunsch's recording to hear how annoying the wind turbine noise is at his home.

Buckeye Wind also argues (at 34) that, except for ear pressure and chest palpitations, Rene Taylor and her family were already experiencing the same types of health problems, albeit less frequently, before the wind turbines arrived. This mischaracterizes Ms. Taylor's testimony. Ms. Taylor actually said that everyone has headaches or sleepless nights from time-to-time, but there is big difference between the home's occupants having two or so headaches per month before the turbines arrived and having three to four headaches per week afterwards. Taylor, Tr. Vol. V 1089. Moreover, no one can claim that her family's new symptoms -- ear pressure and heart palpitations (*id.* at 1095) -- are not serious problems.

Buckeye Wind also implied (at 33) that Ms. Taylor was making up her testimony about the health effects she and her family are experiencing, because she opposed the wind project and sued its owner before construction. However, even the wind developer for that project has found her testimony so credible that it has offered to "make an arrangement where I wouldn't give any more testimony at the expansion hearing" for that project, i.e., a cash offer. Taylor, Tr. Vol. V 1078, 1080.

While Buckeye Wind argues that up to 40 dBA or even 45 dBA is no problem, this assertion rides solely on the statements of David Hessler. Mr. Hessler opined that his own noise measurements show that these noise levels are not problematic. Mr. Hessler did not produce a single engineering standard or piece of literature to support his opinion, other than to misrepresent the findings of the 2009 WHO report. He produced no objective surveys showing that these noise levels are acceptable, in contrast to Eja Pedersen's controlled studies showing substantial noise impacts above 35 dBA. UNU Exh. 47. While he sought to discredit Ms.

Pedersen's work by misleadingly comparing the total number of persons surveyed by her questionnaires with the number of persons annoyed by wind turbine noise, the total number of surveyed persons included a large number of persons (212 out of the 341 surveyed) who were not exposed to noise levels over 35 dBA. Mr. Hessler repeatedly admitted that his procedures for measuring noise did not follow accepted acoustic engineering practices. In fact, Mr. Hessler revealed the lack of support for his methods in the acoustic engineering field in his statement that he is "not real fond of other people's research." Hessler, Rebuttal Tr. Vol. I 2364. Some of his testimony is even contradicted by studies authored by his own father.

In contrast, the UNU Intervenors' expert, Richard James, has used objective criteria from respected acoustical engineering standards and noise literature to formulate his opinions about the noise from this Project. Mr. James is superbly qualified to make these evaluations, since he developed the use of computer models and contour maps to depict noise from new facilities, the same techniques that Mr. Hessler has employed for the Buckeye Wind Project. James Dir., UNU Exh. 31A, Ans. 52. Since Mr. James' presentation to the Institute of Noise Control Engineers on these methods in the early 1970s, almost all acoustical engineers utilize them. *Id.* He has also developed noise modeling software for industry. *Id.* at Ans. 11.

Mr. James has served on the ANSI standards committee that sets acoustical engineering standards followed worldwide, and has contributed to IEC standard 61400-11, the standard used by turbine manufacturers to measure the noise of their turbines. UNU Exh. 31 at 1. Unlike Mr. Hessler, who has represented only industry, Mr. James has had a balanced 40-year career representing industry, government, and citizens. James Dir., UNU Exh. 31A, Answers 4, 7-19. For decades, he worked with such companies as General Motors, Ford, Chrysler, Toyota, Mazda, John Deere, Navistar, Anheuser-Busch, Mitsubishi, and Goodyear. *Id.* at Ans. 11, Ans. 13. He

has worked with the Occupational Safety and Health Administration (OSHA) and the National Institute of Occupational Safety and Health (NIOSH) to establish safe noise levels for industrial workers. *Id.* at Answers 6, 14, 15, 22; UNU Exh. 31 at 2. For 12 years, he taught a Masters level course on noise control and hearing conservation at Michigan State University. James Dir., UNU Exh. 31A at Ans. 20; UNU Exh. 31 at 3.

Mr. James has also had considerable experience with wind turbine noise. He started studying wind turbine noise from operating turbines in North America in 2008, the year after the first major wind projects started operating in North America. James, Tr. Vol. VI 1451-52. Prior to that time, in late 2002, he had already started to study wind turbine noise problems being experienced with wind projects in Europe. *Id.* at 1453; James Dir., UNU Exh. 31A, Ans. 21. While his medical condition prevents him from attending wind turbine conferences in Europe, he has stayed current on their presentations by reading their written papers. James, Tr. Vol. VI 1379, 1448-49. He also shares libraries of information on wind turbine acoustics with other acoustic engineers to stay current on this topic. *Id.* at 1449. He has used his decades of noise modeling expertise to “routinely” model wind turbine noise at wind projects that have harmed their neighbors. *Id.* at 1389. Although Buckeye Wind has attempted to disparage his work by contending that he does not model every turbine in the wind projects he studies, his work has been performed for individual landowners harmed by one or more turbines from each project. *Id.* at 1389-90. That is, it takes only one poorly sited wind turbine to destroy a neighbor’s health and comfort.

Based on Mr. James’ decades of experience in advising industry and government on noise standards and his five years evaluating European wind project problems, in 2008 he collaborated with George Kamperman to prepare a common-sense guide for siting wind turbines.

Id. at 1387-88, 1453-56; UNU Exh. 32.¹ Since the first major North American wind projects started operating, he has traveled extensively to measure the turbines actual noise levels. *Id.* at 1456-57. While Mr. Hessler claims to performed validation measurements on five wind projects, Mr. James has done six, including sound measurements at the Noble Bliss project which proved the inaccuracy of Hessler & Associate’s modeling for that project. *Id.* at 1456-57, 1461-62.

While Mr. James’ recommendations have not always been followed by government bodies, other government entities have adopted them. *Id.* at 1384-86. Those that have ignored his recommendations have harmed their communities. *E.g., see id.* at 1392-93 (after the Tazewell County Zoning Board failed to follow his recommendations, he was called back to the community to assist “a client there who has a noisy turbine located in his backyard”).

However, despite the respect that the acoustic engineering community has for Mr. James, *e.g.*, as shown by his appointment to ANSI standards committee, the Board need not depend solely on his opinions to determine what noise limits should be incorporated into Buckeye Wind’s Certificate. Unlike Mr. Hessler’s field work, Mr. James’ field work is performed in compliance with the widely accepted acoustical standards for measuring sound. Unlike Mr. Hessler’s opinions about the acceptable thresholds for noise, Mr. James’ opinions are corroborated by the work of other respected acoustic engineers and by medical experts who have evaluated the harmful effects of noise. Even without Mr. James’ opinions, the Board need only consider the findings of such authorities as the WHO, Pedersen, Harry, the University of

¹ Buckeye Wind introduced a paper by Geoff Leventhall criticizing the findings of the Kamperman/James paper about low frequency noise. Applicant’s Exh. 16. However, Dr. Leventhall is a consultant for the wind power industry, and as such, his opinions are obviously biased in favor of that industry. Furthermore, his opinions on behalf of the wind industry conflict with earlier positions he took on behalf of the British government earlier in his career before he started assisting the wind industry, and are entitled to no weight. James, Tr. Vol. VI 1417. Dr. Leventhall also misinterpreted the formula recommended by Kamperman/James for regulating low frequency noise, which subtracts background pre-construction low frequency noise so that only the low frequency noise from wind turbines is regulated. *See* page 53 of the UNU Intervenors’ opening brief. That Dr. Leventhall’s conclusions about low frequency noise are suspect is confirmed by the opposite conclusions in a paper written by George Hessler, before he became a consultant for the wind industry. UNU Exh. 69.

Groningen and Goteborg University, the German national government, and the Minnesota Department of Health, not to mention Mr. Hessler's own admissions, to identify the appropriate limit for noise as five dBA above background and a ceiling of 35 dBA.

3. **Buckeye Wind's Predictions Of Turbine Noise Levels Are Anything But "Conservative."**

Buckeye Wind's predictions of noise are hardly conservative. For example, is it conservative to evaluate noise levels during the time of the year when leaves are not rustling and insects are not singing, when those conditions exist for six months of the year? *See* Strom, Tr. Vol. VIII 1914-15. Is it conservative to assume that wind conditions will never be quiet on the ground while the turbines are turning, even though this stable atmospheric condition is actually common? Is it conservative to evaluate the noise levels reaching a person's home when the wind direction is from a turbine to a person's home, when this is a frequent occurrence? *Id.* at 1915. Is it conservative to model all turbines as point sources when some are line sources, and when even Buckeye Wind's representative testifies that some should be modeled as line sources? Is it conservative to assume the model is accurate, when it actually has a five dBA margin of error? Is it conservative to model a turbine that is quieter than the Nordex N100 model that ultimately could be selected for the Project? Obviously, the answer to each of these questions is "no." Buckeye Wind's noise study not only lacks conservatism, it is irresponsible and misleading.

4. **The Board's Prior Decisions On Dissimilar Facilities And The Staff's Position In The Instant Case Provide No Meaningful Guidance For Controlling Wind Project Noise.**

As the ALJs have aptly noted, the Board's Staff is "just another party making another recommendation to the Board." Tr. Vol. VIII 1868. The Staff's position is "another position to be considered by the Board when making their final determination." *Id.* Mr. Strom also acknowledged that the Board's decision will be best informed if it considers all parties'

evidence, not just the Staff's recommendation. Strom, Tr. Vol. VIII 1849. The Staff's post-hearing brief echoed (at 7-8) these observations.

Although the Staff's brief states (at 25) that "the noise modeling conducted by the Applicant was reasonable," the brief noticeably lacks any supporting discussion of facts or rationale. If the Staff actually believed Mr. Hessler's study was accurate, it would have enunciated some basis for that conclusion. As explained below, the Staff's statements in the Staff Report and brief about noise are entitled to no weight and the Board should disregard them.

Buckeye Wind contends (at 17-19) that the noise volumes predicted for the Project are reasonable and will not have an adverse impact, because the Board has allowed other facilities to emit even higher noise levels. Buckeye Wind cites five Board opinions that approved certificates for facilities projected to produce various maximum levels of sound at neighboring residences or property lines: 50 dBA; 54 dBA; 59 dBA; 67 dBA; and 75 dBA.

Staff member Raymond Strom, in response to leading questions from Buckeye Wind's counsel, testified that the Board has had a "rule-of-thumb" standard of 50 dBA for the property line, or possibly 55 dBA, he wasn't sure. Strom, Tr. Vol. VIII 1937-38. He said that he thought 50 dBA "was referenced frequently as a property line number" in past Board cases (*id.* at 1880-81), but apparently the review of the Board's decisions by Buckeye Wind's counsel has not revealed any such cases. The approved noise levels at property lines in decisions touted by Buckeye Wind were 55 dBA (AMP-Ohio), 67 dBA (Aquila Fulton), and 75 dBA (PG& E). *In re American Municipal Power-Ohio, Inc.*, Case No. 06-1358-EL-BGN, Opinion, Order, and Certificate, Mar. 3, 2008 ("AMP-Ohio"), at 39; *In re Aquila Fulton County Power, LLC*, Case No. 01-1022-EL-BGN, Opinion, Order, and Certificate, May 20, 2002 at 12, 15; *In re PG&E Dispersed Generating Co.*, Case No. 00-922-EL-BGN, Opinion and Order, Feb. 12, 2001 at 22.

Given the inconsistency in the Board's prior practices, the Board's past decisions provide no support for using 50 dBA, 55 dBA, or any other number as the usual standard for the property line.

This list of approved noise levels has two characteristics that betray the Staff's lack of expertise in noise regulation. First, no approved noise level appears twice – they are completely random. Second, there is a broad range of 25 dBA between the lowest and highest authorized noise level. There's "no rule-of-thumb" at all. If the Staff advising the Board in these cases had any concept about what noise levels are safe, healthy, and tolerable, the authorized sound levels would be consistent rather than wildly variant.

In only two of these cases did any intervenors make an appearance to test any of the representations made by the applicants about their projects. Even those two cases mention no noise information produced by the intervenors. In short, there appears to have been no effort in the cited cases to test the applicants' assertions about the effects of their noise levels on the neighbors' health and comfort. Having no such information and no acoustical expertise of its own, the Staff in those cases simply acquiesced to the noise levels the applicants predicted their projects would produce.

Moreover, as a legal principle, the Board may not use opinions or findings in other cases as evidence to support its decision in the instant case. Facts in other cases have not been heard or tested by cross-examination in the instant case. Furthermore, as one court has expressed it, "[t]he rationale for the rule that a trial court cannot take judicial notice of proceedings in a separate action is that the appellate court cannot review the propriety of the trial court's reliance on such prior proceedings because that record is not before the appellate court." *NorthPoint Properties, Inc. v. Petticord*, 179 Ohio App.3d 342, 348 (8th Dist. 2008). For these reasons, it is

erroneous to take judicial notice of facts described in court opinions, even if those opinions are issued by the same court. *Id.* Also see *Sinclair v. Sinclair*, 182 Ohio App.3d 691, 695 (4th Dist. 2009) (a court may not take judicial notice of prior proceedings in the court, but may only take judicial notice of prior proceedings in the immediate case); *Diversified Mortg. Investors, Inc. v. Athens County Bd. of Revision*, 7 Ohio App.3d 157, 159 (4th Dist. 1982) (same holding). Consequently, the approved noise levels in the Board's other cases provide no guidance herein, and to use them as a basis for the Board's decision would be error.

There is also no evidence that the Board's conclusions about noise in other cases are factually applicable to the instant case. While the Buckeye Wind Project area is a very quiet rural community, some of the other cases involved additional facilities in industrialized areas where the noise was already high. This is an important distinction between these prior Board cases and the present case, because existing sound masks new noise sources. For example, the home nearest the PG&E facility was already exposed to 50 dBA prior to facility operation. *PG&E* at 6. While this home was located 2000 feet from the facility, the Board's certificate prohibited noise levels above 56 dBA at 1000 feet from the facility, making it likely that facility noise levels would decrease to the pre-existing level of 50 dBA by the time it reached the home. *Id.* at 10. The pre-existing noise levels near the Duke Energy Hanging Rock facility ranged from 61-65 dBA in daytime and above 50 dBA at night. *In re Duke Energy Hanging Rock, LLC*, Case No. 01-175-EL-BGN, Opinion, Order and Certificate, Sept. 17, 2001 at 17. The facility was projected to produce 51-59 dBA of noise, i.e., less than the ambient levels, and the Board prohibited the applicant from exceeding that level. *Id.* at 17, 22. In both of these cases, the Board prohibited the facilities from increasing the noise levels in the communities. In two other cases, the Board's opinions do not reveal the ambient background noise levels, so whether the

facilities would increase the noise levels is unknown. Accordingly, none of these cases are inconsistent with evidence from the UNU Intervenors and admissions by Buckeye Wind's witnesses that sound increases over five dBA are intrusive. If anything, they support the finding that the Board should not approve noise increases above five dBA.

The Board approved 67 dBA for the property line and 60 dBA for the residence of the nearest neighbor in the Aquila Fulton County Power application, even though these noise levels would have such a serious adverse effect that the applicant "offered to buy this property should the owner wish to move." *Aquila Fulton* at 12, 15. Surely, this is not a case the Board wishes to use as precedent, although this will be the Project's effect if the Board accepts it as is.

Without testing the noise information that may have been produced in the other cases, there is no evidence that it has any applicability to the instant case. However there is substantial information to the contrary. For example, none of the Board's past opinions dealt with wind turbines. None of the past approved facilities appear to produce the amplitude modulation that afflicts the neighbors of wind farms. The noise levels tolerated in prior Board decisions have no value in assessing wind turbine noise, which is highly annoying and sleep depriving at much lower levels than other noise sources.

In addition, none of the other facilities appear to have threatened the number of neighbors that Buckeye Wind's Project does. While every person deserves the government's protection from harmful impacts, the thousands of persons threatened by Buckeye Wind's noise set this Project aside from the others.

Buckeye Wind's suggestion that 55 dBA at the property line is adequate is belied by Mr. Hessler's own testimony. In his direct testimony, he stated that noise levels over 45 dBA "have led to what I would consider justified complaints." Hessler Rebuttal Dir., Applicant Exh. 26,

Ans. 13. While Mr. Hessler was referring to noise levels at neighboring residences, the same noise levels will bother persons who, as they have the right to do, build new homes near their property lines or wish to enjoy recreational or occupational activities on their land.

Given the lack of credibility of Mr. Hessler's arguments, it is not surprising that Buckeye Wind attempts to bolster its position by arguing that the Staff is experienced in noise control and came to the same conclusions. However, while Buckeye Wind proclaims that the Board's prior decisions on noise demonstrate the Staff's experience with noise, the wildly inconsistent noise levels approved in those cases illustrate the opposite.

Furthermore, the Staff gave the noise evaluations in those cases so little thought that the Staff member responsible for reviewing noise studies, Raymond Strom, could not remember the past projects in which he had reviewed noise issues other than one project he vaguely referred to as the "Norton project." Strom, Tr. Vol. VIII at 1875-76, 1878. He could not recall the noise issue from a case decided as recently as 2008 even while reviewing the decision. *Id.* at 1938-39.

The Staff has revealed no expertise in acoustics that would lend any credibility to its acquiescence to Mr. Hessler's study. Mr. Strom has degrees in botany and zoology, not acoustical engineering. *Id.* at 1844, 1856. Mr. Strom was aware of no Staff employee with an acoustical engineering degree. *Id.* at 1872. The Staff did not consult with any employee in state government with acoustical engineering expertise, nor did it recruit anyone with acoustical expertise to review Buckeye Wind's noise study. *Id.* at 1846-47, 1872. Mr. Strom betrayed the Staff's lack of knowledge about noise impacts by admitting:

- He has no specialized training in acoustics (*id.* at 1856);
- He has had no training of any kind in noise modeling (*id.* at 1878);

- He attempted to educate himself about noise issues by reading some noise articles on the internet, but could not even remember what publications he had read (*id.* at 1850, 1872-73);
- He did not review the noise report prepared by the Champaign County Wind Turbine Study Group to familiarize himself with the issues in this case (*id.* at 1850);
- The Staff has no modeling software to test the validity of an applicant's noise model (*id.* at 1853, 1856);
- He was not familiar with the acoustical engineering standards that must be followed to measure noise accurately, nor did he utilize them to determine whether Mr. Hessler's work was accurate (*id.* at 1879);
- He did not know where microphones may or may not be placed to obtain accurate noise measurements in a background noise study (*id.* at 1879);
- Until reading the reports in this case, he was unaware that the acoustical engineering field commonly uses five dBA above background as the threshold for determining the effects of new sources of noise (*id.* at 1891);
- He did not know that background noise measurements are supposed to be taken during winter to avoid leaf rustle and insect noise (*id.* at 1913);
- He did not know whether wind turbines should be modeled as line sources or point sources (*id.* at 1924);
- While professing a lack of concern about health problems from noise, he also admitted that he was unaware of the WHO findings on health problems from noise (*id.* at 1926, 1930); and

- He was unfamiliar with reports by Pedersen and others on annoyance from wind project noise (*id.* at 1930, 1933).

Regrettably, in this case, the Staff in the instant case has fallen back on its old habits despite the availability of ample information about the harmful effects of noise. That is, just as in previous cases, it has meekly accepted whatever noise levels the Applicant wants to produce. Mr. Strom knew that entire subdivisions of homes are predicted to suffer from noise levels more than five dBA over background. Strom, Tr. Vol. VIII 1898. Nevertheless, the Staff gave little thought to noise problems in the instant case. Mr. Strom did not meet with Buckeye Wind to discuss the noise issues. Strom, Tr. Vol. VIII 1876. He said, “I suspect that we covered noise” in a telephone conversation with Buckeye Wind representatives, but he was not sure. *Id.* He knows he did not talk to the Applicant’s noise consultant. *Id.* at 1912. He did not test the accuracy of Buckeye Wind’s background study, but merely read Mr. Hessler’s discussion of it in the Application. *Id.* at 1879. The Staff would not meet at all with the UNU Intervenors despite their request for an opportunity to discuss the Application with the Staff. Siegfried, Tr. Vol. VIII 1816. In short, the Staff did little to educate itself about the noise impacts from the Project, and studiously ignored information that the public endeavored to educate them. Now, the Staff is ignoring the evidence brought to its attention in the hearing.

At the time the Staff was reviewing the Application, it knew that the noise study had ignored the noisiest candidate turbine model, the Nordex N100, but the Staff did nothing about it then or now. Strom, Tr. Vol. VIII 1900-01. The Staff should have insisted that Buckeye Wind redo its model before the hearing, using the correct model. The Staff’s report and brief do not even recommend that the Board preclude Buckeye Wind from using this model or resubmit the model for the Board’s review, even though Mr. Hessler admits that his model has to be redone if

it is used. Proposed Staff condition 50 would allow Buckeye Wind to use any of three turbine models contained in the Application. Buckeye Wind's brief asks (at 16-17) the Board to allow it to select any turbine model as long as it informs Staff of its selection and provide information "that the impacts associated with the turbine would not exceed those associated with the three turbine models listed in the Application." So even though Buckeye Wind has not modeled the noise from the Nordex N100, it still wants the option to select any other model that is just as noisy.

Based on its ignorance of acoustics, the Staff simply adopted Buckeye Wind's false assertions that its study represents "conservative" assumptions, when it actually grossly underestimates noise impacts. In sum, the Staff's report does no more than summarize Buckeye Wind's noise study.

Even Mr. Hessler's answers to questions of Staff's counsel during the hearing identified unacceptable noise impacts of up to 42 dBA -- 13 dBA over Mr. Hessler's background sound readings of 29 dBA. Hessler, Tr. Rebuttal Vol. I 2383-91. At least 1004 homes will be exposed to noise over 34 dBA, which is higher than the acceptable five dBA increase over background. Nevertheless, the Staff has done nothing to critically evaluate the Applicant's noise study. To say the least, the Staff's lack of effort and candor displays a disappointing reluctance to do what it knows is necessary not only to protect the public, but to prevent the damage to the wind power industry that will result from the public relations fallout from this poorly designed Project.

While the Staff may believe that its unquestioning acquiescence to the Applicant's wishes will promote the production of wind energy in Ohio, its lack of leadership will have the opposite effect. If the Board allows this Project to proceed without reducing its noise levels to a safe and

comfortable level, the outcry will discourage any other community from welcoming wind energy production to their neighborhood.

While the Board may not have possessed any information about the harmful effects of high noise volumes in past cases, it has adequate information in the instant case to make an informed decision. Unlike in past cases, the UNU Intervenors have produced expert testimony revealing the harmful effects of the noise levels predicted by the Applicant's own noise consultant, and the Applicant's own evidence confirms these harms. Unfortunately, the effect of this Project is not limited to giving "one person a headache once a year" as hypothesized by Buckeye Wind's counsel. Tr. Vol. VIII 1934. The UNU Intervenors urge the ALJs and the Board to carefully consider the evidence in this case rather than rubberstamping the Applicant's project.

5. The Certificate Needs To Have An Enforceable Noise Limit That Provides Clarity On The Standard To Be Met.

Despite the criticality of noise issue, the Staff Report recommends only two generally worded conditions to prevent noise problems in the Project area. One condition requires "[t]hat the Applicant operate the facility within the noise parameters as set forth in its noise study and presented in its application." Staff Exh. 2 at 57, Condition 6.

This condition falls far short of protecting the public against unacceptable noise volumes. Condition 6 contains no decibel limit that Buckeye Wind must meet. Given that everyone, including Buckeye Wind, now knows that the Applicant's noise model grossly under-predicts the noise levels at neighboring land and homes, it is not surprising that the Applicant has not endorsed a definite numeric limit for the noise levels allowed from the Project. Mr. Strom testified that he thought Condition 6 would adequately protect the public despite errors such as modeling the wrong turbine model. Tr. Vol. VIII 1901. But he also testified that he would only

consider the Project in noncompliance “if under the normal course of operation over extended periods of time [it is] found to be operating outside these parameters.” *Id.* at 1902.

Notwithstanding that the Application predicts unacceptably high noise volumes, apparently Mr. Strom believes that Condition 6 does not even consistently hold the Project to those levels. So, does this condition allow Buckeye Wind to emit noise higher than modeled for 50% of the time? How high may the volume be during these times of excursion? Does this condition allow higher noise levels to be heard at neighboring land and homes during the stable atmospheric conditions that have produced the most complaints from other projects? How long may the Applicant exceed the modeled levels before it is deemed noncompliant? Certainly, if the Board ever attempts to enforce this condition, Buckeye Wind will argue that it is vague and subject to a multitude of interpretations.

To have any meaning, the Certificate’s conditions must incorporate objective standards. In fact, this may be the only valid conclusion that can be drawn from the Board’s prior approvals of noise conditions. While some of the Board’s prior certificates have contained vague noise restrictions, others have included objective, numeric noise levels that the applicant must meet. For example, the condition cited by Buckeye Wind in *Fremont Energy* requires the applicant to “maintain sound levels resulting from the operation of the facility at or below 50 decibels A scale at the nearest noise sensitive receptor.” *In re Fremont Energy Center, LLC*, Case No. 00-1527-EL-BGN, Opinion, Order, and Certificate, May 21, 2001 at 16. While this condition is not perfect, e.g., the meaning of a “noise sensitive receptor” is unclear, at least it provides a specific decibel level to be met. Similarly, the PG&E certificate restricts noise levels to “at or below 75 dBA at the property line of the facility and at or below 56 dBA at 1,000 feet from the facility.”

A specific numeric limit is also necessary to address Buckeye Wind's fear that negative attitudes towards wind turbines produces a subjective perception that the noise is too loud. As an aside, the fact that a person annoyed by wind turbine noise is more likely to have negative feelings about wind turbines can hardly be a surprise, since annoying wind noise obviously causes negative feelings. The correlation between negative attitude and annoyance can just as easily be explained by the fact that persons profiting from noise-producing structures usually are not annoyed by the loud noise, just like the driver of the "boom box" car. *See* Mundt Dir. Testimony, Applicant Exh. 6 at 9 (acknowledging that the economic beneficiaries of wind projects are less bothered by the noise). Nevertheless, Buckeye Wind makes the point (at 28) that a complaint procedure may be used to separate legitimate noise complaints from subjective complaints fueled by attitude. But if the Certificate contains no specific numeric standard, there will be no objective means to determine whether the noise is too high.

6. The Complaint Resolution Procedure Should Be Modified To Make It Meaningful.

The other noise condition included in the Staff Report requires that the Applicant submit a "completed noise complaint resolution procedure" for Staff approval. Staff Exh. 2 at 59, Condition (8)(j). The complaint resolution procedure has not yet been submitted to the Board. Strom, Tr. VIII 1858-59. The Board should require the Applicant to submit the procedure as part of the Application, so that the public can provide input to increase its effectiveness. The complaint resolution procedure should be expanded to include complaints about other issues as well as noise.

In addition, the Board's Staff should investigate the complaints, not the Applicant. As explained in the UNU Intervenors' Opening Brief, the sponsor of the noise model should never validate the operating levels of the noise source. Obviously, the inherent bias in allowing the

offender to evaluate the merits of the offenses would make such a complaint evaluation process meaningless. To overcome this bias, the Certificate should require Buckeye Wind to provide the Staff with the funds necessary to retain a consultant answerable only to the Staff to investigate any complaints, or require Buckeye Wind to reimburse the Staff for retaining a consultant for that purpose. The Board will need the assistance of a consultant to respond to the inevitable complaints about noise, shadow flicker, and other problems due to their sheer number if the Project is irresponsibly sited as proposed.

Furthermore, even if the complaint resolution procedure calls for the Applicant to receive and investigate the complaints, the Applicant should forward a detailed record of each complaint to the Board so that the Board and the public can monitor the adequacy of the Applicant's responses, and the degree to which the Project is causing problems.

Most importantly, a complaint resolution procedure of any description is worthless without an objective standard to evaluate the merits of the noise complaints. While Buckeye Wind says that a complaint resolution procedure will provide an objective means to determine whether noise is too loud, it cannot do so if the Certificate does not identify a decibel level that is too high. Without a numeric noise limit, there will be no standard to adjudge whether a complaint is valid. Just as prior Board decisions, there must be specific limits on the noise levels.

The Certificate must also require the Applicant to submit a plan to reduce noise levels if found to be higher than the limit. This is consistent with the Staff's observation that the magnitude of this Project and its potential impacts make the implementation of mitigation and, when possible, avoidance measures critical to minimize impacts. Staff's Opening Brief at 14. The certificate in *AMP-Ohio* required such a condition, and it makes sense here. *AMP-Ohio* at

39. Without an objective noise limit and a procedure to mitigate higher levels, the complaint resolution procedure is merely window dressing to disguise the ineffectiveness of the noise control measures in the Certificate.

C. **Shadow Flicker Is Indisputably A Nuisance Impact Of The Project That Warrants Effective Mitigation.**

Buckeye Wind tries in vain to diminish the impact of witness Larry Wunsch's video (UNU Exh. 30), observing that because the video of shadow flicker was taken in his shed rather than his house, there must not be any flicker in his house. Applicant's Opening Brief at 55. Mr. Wunsch's comments on the video clearly refute that contention. He states, "Inside the house the effect is the same as if someone were turning a light switch on and off." UNU Exh. 30 at 00:01:30. The point of the video clips of flicker in his shed was to "show you what it is like, so if someone would have windows that would be pretty much covering one side of their house, this is the light coming in through the house now with the flicker." *Id.* at 00:02:40. Mr. Wunsch's video speaks for itself. It starkly illustrates the nuisance effects of shadow flicker, both outdoors and indoors.

Buckeye Wind further argues (at 52) that Denmark's 10-hour shadow flicker exposure threshold is irrelevant because Ohio is at a lower latitude than Denmark. Of course, differences in latitude have nothing to do with the reasonableness of shadow flicker exposure. What is deemed a reasonable threshold for people in Denmark should be reasonable for people in Ohio as well. If anything, the difference in latitude should make it easier for Buckeye Wind to comply with a 10-hour flicker exposure threshold, since the higher angle of the sun at lower latitudes will lead to less annual flicker exposure to mitigate. Applicant's Opening Brief at 53; Doss, Tr. Vol. IX 2221-22.

As is the case with Buckeye Wind's "design goal" for wind turbine noise, it has proposed an exposure threshold of 30 hours/year but then disregards it when convenient. According to its shadow flicker modeling, five of its turbines will contribute to shadow flicker on neighboring properties in excess of the proposed 30 hours/year threshold. Staff Exh. 2 at 44. This is not only unfair and unreasonable as to the affected neighbors, it is also vague and unenforceable as a means of mitigating nuisance impacts of the Project. Turbines that are shown by modeling to exceed the established shadow flicker threshold should not be constructed.

D. The 500-Foot Minimum Setback Recommended By Staff Has Been Proven At Hearing To Be Inadequate To Protect Neighboring Properties From The Hazards of Blade Shear And Ice Throw.

It is disappointing that the Staff remains apparently unconcerned about the potential hazards to neighboring properties from blade shear and ice shedding, despite the evidence at the hearing demonstrating the deficiencies in the Staff Report's treatment of these topics. Although the Staff asked Buckeye Wind on September 16 for an equation or calculation of the maximum distance for blade throw or ice throw from the three turbines being considered by Buckeye Wind (Staff's First Interrogatories ## 18, 21), they were still awaiting that information from Buckeye Wind at the time of the evidentiary hearing. Conway, Tr. Vol. VIII 1990. Yet, despite an admitted lack of information, and despite industry standards that call for greater setbacks, the Staff adamantly maintained at the hearing that the 500-foot statutory minimum property line setback would be adequate to protect neighboring properties. *Id.* at 1988.

Andrew Conway acknowledged that at the time of the evidentiary hearing, the Staff did not have an adequate means of calculating the maximum distance for blade throw from a 100-meter tower. *Id.* at 1987. Instead, he simply accepted the representation of Buckeye Wind's consultant that the maximum blade throw distance for an 80-meter tower with an 80-meter rotor

was “approximately 500 feet.” *Id.* at 1983, 1986. Mr. Conway acknowledged that a blade from a larger turbine, such as those proposed for the Project, could be thrown further. *Id.* at 1983.

With regard to ice shedding, Mr. Conway relied on representations in the Application that “ice typically lands within 300 feet and that the risk is negligible beyond 722 feet.” *Id.* at 1990. Again, he did not confirm that representation through any independent means. *Id.* He was unaware of guidance from GE Energy (UNU Exh. 13) recommending a “safe distance” of 984 feet for ice throw, based on a formula of $1.5 \times (\text{hub height} + \text{rotor diameter})$. *Id.* at 1992-93.² The GE document states that its recommendations are based on “recognized industry practices” and are recommended by the certifying agency Germanischer Lloyd and the German Wind Energy Institute. UNU Exh. 13 at 1. Yet despite admitting that he was unfamiliar with the GE guidance, Mr. Conway dismissed it, explaining that “I understand that this formula is to be used where there is heavy icing conditions and heavy icing areas, and I’m not aware that Ohio is a heavy icing area.” *Id.* Nowhere in the GE guidance, however, did it state that the “safe distance” formula was limited to “heavy icing areas.” UNU Exh. 13. Mr. Conway also stated that he believed that Buckeye Wind would not operate the turbines when there is ice on the blades (Conway, Tr. Vol. VIII 1993), but conceded that the Staff Report did not recommend a condition that prohibits such operation. *Id.* at 1994. Such a recommendation is also not included in the Staff’s Opening Brief.

The Staff is apparently content to recommend the minimum 500-foot property line setback despite an industry standard specifying a safe setback of nearly twice that distance, and despite an admitted lack of knowledge concerning the maximum blade throw distance for a 100-

² The UNU Intervenors requested a meeting with Staff before issuance of the Staff Report to bring to their attention this guidance and other relevant information concerning safe setbacks, noise, and other Project-related issues and concerns. The Staff declined to meet with the UNU Intervenors. Siegfried, Tr. Vol. VIII 1816. However, the Staff met with the Applicant and its representatives a number of times leading up to the Staff Report. *Id.*; Doss, Tr. Vol. VIII 2077-78.

meter turbine. This is clearly inconsistent with Mr. Siegfried's representation that the Staff considered the worse-case impacts in their analysis. Siegfried, Tr. Vol. VIII 1829. Mr. Siegfried explained that the Staff made an "initial policy decision based on the minimum setback requirements," but noted that "additional information may be obtained." *Id.* It is astonishing that the Staff continues to cling to that "initial policy decision" despite the evidence at hearing indicating that the 500-foot setback is inadequate and potentially unsafe.

The same can be said about the Staff's reaction to the recommendation of turbine manufacturer Nordex that there normally must be at least 500 meters (1,640 feet) between a turbine and a residence. UNU Exh. 12. In its brief (at 24), the Staff dismisses that recommendation, reasoning that it presumes that the developer has not performed a site-specific noise or shadow flicker study. This is an unsubstantiated assumption, however; nowhere in the Nordex micro-siting guidance does it condition its recommendations in that fashion.³

Upon questioning by Applicant's counsel, Mr. Conway agreed that the formulas for blade shear and ice throw would be provided before the preconstruction conference, so there should be "no fear that the turbines will be built if they don't meet these standards." Conway, Tr. Vol. VIII 1996. This begs the question why Buckeye Wind did not produce that information by the time of the evidentiary hearing, two months after the Staff's request. As discussed in more detail below, it would be unlawful for the Board to defer consideration of this important siting information until after the conclusion of the evidentiary hearing and the issuance of a certificate. The Board should not approve the Project based upon setbacks proven at hearing to be unsafe. If the Board

³ For the record, the UNU Intervenors are not asking the Board to apply the recommended Nordex setback, as suggested by the Staff (Opening Brief at 24), because far greater setbacks are warranted to mitigate the harmful effects of wind turbine noise. The Nordex micro-siting guidance is significant because it is a glaring example of how Buckeye Wind, and even the Power Siting Board Staff, have overlooked industry standards in their determination to apply the bare minimum setbacks under law. UNU Intervenors' Opening Brief at IV.

believes additional information is necessary to determine adequate setbacks for blade shear and ice throw, the Board should reopen the evidentiary hearing on that issue to allow full participation of all parties of record in those deliberations.

E. The Applicant's Plans To Obtain An Incidental Take Permit Confirm The Project's Damage To The Indiana Bats In The Project Area, So The Board Needs To Take Actions Necessary To Protect The Bats And Their Habitat.

While Buckeye Wind admits (at 35) that endangered Indiana bats have been found less than one mile from the Project area, the Applicant misleadingly argues that its Habitat Conservation Plan and Incidental Take Permit will prevent the turbines from harming the bats. However, the Incidental Take Permit authorizes Buckeye Wind to kill and harm the bats. While the Habitat Conservation Plan may reduce the damage to some degree, it will not prevent this damage altogether. If no harm will befall the bats, no Incidental Take Permit would be necessary.

The same observation applies to Buckeye Wind's contention (at 36) that the Project "will not be an adverse impact" on the bats. The Applicant's quotes (at 36) from Cara Meinke state that the bats' preference for tree habitat "reduces" the risk, not eliminates it. And Ms. Meinke admitted during the hearing that Indiana bats forage in open areas such as fields, and, in fact, were tracked doing so during her survey in the former portion of the Project area located in Logan County. Moreover, if Buckeye Wind is accurate in its assertion (at 37) about the minimal acreage of trees to be destroyed in the Project, then it should have no objection to the conditions proposed in the UNU Intervenors' Opening Brief for protecting the bats' roost and maternity trees.

The UNU Intervenors refer the Board to their Opening Brief (at 61-67) for additional information rebutting Buckeye Wind's arguments on bats.

F. The Evidence Demonstrates That The Project Will Have An Adverse Effect On Aviation.

Evidence at hearing showed that the Project, if constructed, will have a significant adverse impact on aviation in and around the Project area. Two principal impacts would be (a) interference with emergency medical flights into and out of the Project area, and (b) hazards due to penetration of turbines into protected airspace.

John Holland testified that in certain weather conditions, CareFlight operations in the area of the Project could be delayed by as much as 6 to 8 minutes by the presence of 70 closely-grouped turbines. Holland, Tr. Vol. IX 2181; Urbana Exh. 6, Ans. 16. According to Mr. Holland, this would adversely affect the most critical component of CareFlight operations –speed -- in order to minimize the time to get patients to Level I trauma care. *Id.*, Ans. 20. The first hour after the accident is the most critical to the patient in determining survival or recovery time. *Id.*, Ans. 10. In situations where turbines prevent medical flights from landing at the accident site, it would be necessary to move the patient, resulting in further delay and potential further harm to the patient. *Id.*, Ans. 11.

The Staff has recommended a certificate condition prohibiting the construction of any turbine for which the FAA has made a presumed hazard finding or which does not meet the requirements of the Ohio Office of Aviation. Staff Exh. 2, Cond. 36. As of the conclusion of the evidentiary hearing, the Office of Aviation had recommended disapproval of eleven of the Project's 70 turbines due to the penetration of the turbines into protected airspace. Staff Opening Brief at 19. (The turbines in question are identified as Turbines 19, 29, 46, 48, 50, 57, 58, 60, 61, 62, and 63. *Id.*) Based on this recommendation of the Office of Aviation, the Board should deny approval of the turbines in question. For the following reasons, the Board should not defer the

approval or disapproval of any of the Project's turbines based on post-certificate determinations of the FAA or the Office of Aviation.

Revised Code § 4906.10(A)(5) provides that the Board may only issue a certificate upon a finding that the Project will comply with all rules and standards adopted under R.C. § 4961.32. Section 4906.10(A)(5) further requires the Board, in determining such compliance, to consult with the Office of Aviation under R.C. § 4561.341, which provides as follows:

Pursuant to any consultation with the power siting board regarding an application for certification under section 4906.03 or 4906.10 of the Revised Code, the office of aviation of the division of multi-modal planning and programs of the department of transportation shall review the application to determine whether the facility constitutes or will constitute an obstruction to air navigation based upon the rules adopted under section 4561.32 of the Revised Code. Upon review of the application, if the office determines that the facility constitutes or will constitute an obstruction to air navigation, it shall provide, in writing, this determination and either the terms, conditions, and modifications that are necessary for the applicant to eliminate the obstruction or a statement that compliance with the obstruction standards may be waived, to the power siting board under section 4906.03 or 4906.10 of the Revised Code, as appropriate.

As of the conclusion of the evidentiary hearing, the Office of Aviation recommended disapproval of Turbines 19, 29, 46, 48, 50, 57, 58, 60, 61, 62, and 63 for the reasons stated above. Staff Opening Brief at 19. There is no evidence that the Office of Aviation provided a written statement that compliance with the obstruction standards may be waived with respect to those turbines. Therefore, because the turbines in question violate the rules and standards of the Office of Aviation under R.C. § 4961.32, the Board may not issue a certificate for those turbines.

Buckeye Wind suggests (at 41) that the Board should defer to "FAA oversight in regards to aviation safety," citing *In re Columbus Southern Power Co.*, OPSB No. 06-0030-EL-BGN, Opinion, Order, and Certificate, April 23, 2007. However, in that case, the Ohio Office of

Aviation expressed no concerns whatsoever with the height of the project's structures. *Id.* at 12. Therefore, in the absence of evidence that the project would violate any rules or standards of the Office of Aviation, there was no legal impediment to certification of the project on those grounds. *See also, AMP-Ohio* at 16-17. Nonetheless, the Board prudently required the Applicant to file for necessary permits with the FAA. *Columbus Southern* at 12. *See also AMP-Ohio* at 13. This should not suggest, however, that the Board should defer to the FAA over the Ohio Office of Aviation concerning compliance with the rules and standards under R.C. § 4961.32. Furthermore, it would be contrary to R.C. § 4906.10(A)(5) for the Board to approve the siting of turbines shown to currently violate Office of Aviation standards, contingent on possible compliance with those standards or FAA regulations at some future time. *See Applicant's Opening Brief* at 42; Staff Exh. 2, Cond. 36. If, in the future, the Applicant can demonstrate that those turbines can comply with Office of Aviation standards, the Applicant should be required to apply for a certificate modification or a separate certificate, subject to all rights of public notice and participation under Chapter 4906 and the Board's rules.

G. The Weight of Evidence Demonstrates That the Project Will Adversely Affect Property Values.

The UNU Intervenors offered the expert testimony of Thomas Sherick concerning the likely impacts of the Project on neighboring real estate values. Sherick Dir., UNU Exh. 22A. Mr. Sherick has over 15 years of experience as a professional real estate appraiser, and is a Member of the Appraisal Institute. UNU Exh. 22. Members of the Appraisal Institute are practicing real estate appraisers who have met rigorous requirements (significantly above state and federal standards) relating to education, experience, and demonstrated knowledge and ability. Sherick Dir., UNU Exh. 22A at 3. Mr. Sherick is experienced in the review and analysis of a broad range of real property types, including commercial, mixed-use, and residential

development properties. *Id.* at 2. He is also experienced in the appraisal of individual residential properties. Sherick, Tr. Vol. VI 1290. He has regular professional experience with the Champaign County real estate market and was familiar with the character of eastern and central Champaign County prior to the preparation of his direct testimony. *Id.* at 1335; Sherick Dir., UNU Exh. 22A at 4.

Mr. Sherick testified that although the magnitude of the Project's impact on property values will vary depending on property type and proximity to turbines, the Project would likely reduce the value of vacant land by at least 6.5 % and the value of parcels with development potential by as much as 50%. In his opinion, home values in the vicinity of the Project would decrease at least 10%. Sherick Dir., UNU Exh. 22A at 15.

It is remarkable that Buckeye Wind attacks the credibility of Mr. Sherick because he relied upon hearsay information (at 49), when Buckeye Wind's own case on this issue depends so heavily on hearsay. Buckeye Wind offered no expert testimony on the subject of property value impacts. While Mr. Shears offered some vague opinions concerning the subject (Shears Dir., Applicant Exh. 1 A. 19), he is not a real estate professional and was not qualified as an expert on that subject. His testimony, and the report of Saratoga Associates that he "sponsored," are pure hearsay.

Mr. Sherick, on the other hand, was entitled to testify concerning property value even though his testimony was based in part on hearsay. *Masheter v. C. H. Hooker Trucking Co.*, 19 Ohio App.2d 169, 170 (5th App. Dist. 1969). His opinions were not based entirely or inordinately on hearsay, however. Rather, the information provided to him by realtor Patrick Hamilton assisted him in validating hypotheses he had already developed through his literature

review and his personal knowledge of analogous property value impacts from high voltage transmission lines (HVLTs). Sherick Dir., UNU Exh. 22A at 4.

Contrary to Buckeye Wind's contention (at 50), Mr. Sherick's opinions regarding Project-related negative market perception are not inconsistent with Ms. Johnson's recent purchase of 184 acres of undeveloped property next to her home. Ms. Johnson, as an existing resident in the Project area, had a significant incentive to acquire that property notwithstanding the announcement of the Buckeye Wind Project—to gain control of the adjacent property to prevent the siting of a wind turbine directly over her house. Those circumstances are different from those of an outside purchaser assessing properties in the Project area. Furthermore, any incentive for such “defensive acquisition” by existing residents in the Project area will evaporate if and when the Project is fully constructed.

Mr. Barce's perceptions of the real estate market in Benton County, Indiana are not probative of the likely property value impacts resulting from the Buckeye Wind Project. First, Mr. Barce admitted that he is not a real estate appraiser. Barce, Rebuttal Tr. Vol. II 2447-48. And for the reasons set forth in the UNU Intervenors' Opening Brief (at 77-78), Benton County is vastly different from Champaign County in terms of population density, population growth, economy, and residential characteristics and demand. Furthermore, more than 90% of rural landowners in Benton County have an economic interest in wind development in one form or another. *Id.*

In sum, the weight of evidence indicates that the Project, as currently proposed, will have a profound negative impact on the property values of landowners and homeowners in eastern and central Champaign County. This impact is not accounted for in either the Application or the Staff Report, but it should not be ignored. A project that would cause such dramatic impacts

would not serve the public interest, convenience, and necessity under R.C. § 4906.10(A)(6). For the reasons discussed in the UNU Intervenors' Opening Brief (at 78-79), any certificate for the Project should include property value mitigation in the form of a Property Value Protection Agreement.

III. ADDITIONAL PROTECTIONS ARE NECESSARY TO ENSURE ADEQUATE DECOMMISSIONING OF TURBINES.

At least with regard to Buckeye Wind and the Staff, the concerns and objections of the UNU Intervenors have largely fallen on deaf ears. On the subject of decommissioning, however, the UNU Intervenors recognize that the Staff and Buckeye Wind have both tried constructively to address some of their concerns. *E.g.*, Applicant's Opening Brief at 61-63; Staff's Opening Brief at 31. However, notwithstanding the acknowledged improvements in the decommissioning conditions as set forth in the briefs of the Staff and Buckeye Wind, the following additional protections are warranted:

1) There is no basis to conclude that either Buckeye Wind's or the Staff's recommended bond amount will be sufficient to cover decommissioning costs. The UNU Intervenors' concerns with the Staff's approach (no less than 25% of decommissioning costs in the case of a surety bond (Staff Opening Brief at 32)) are discussed in detail in the UNU Intervenors' Brief at 92-93. As long as Buckeye Wind is given the option of a surety bond for financial assurance, the Staff's 25% approach is not adequately protective because the Staff could not justify at hearing how that figure was likely to cover net decommissioning costs. *Id.*

Buckeye Wind shares the UNU Intervenors' concern that there is no basis for the Staff's 25% minimum bond approach. Applicant's Opening Brief at 60. However, Buckeye Wind's alternative proposal is equally unsupported. Buckeye Wind proposes to calculate the bond amount at decommissioning costs minus 75% of salvage value, claiming that this approach

provides a 25% safety factor as to fluctuations in scrap values. *Id.* at 60-61. However, Buckeye Wind provides no rationale as to why its alternate approach is any more appropriate than the Staff's.

Despite Buckeye Wind's assertion to the contrary (at footnote 25), UNU Exhibit 29 does indeed illustrate that historic scrap values have dropped by nearly 400% over periods as short as seven months. This evidence illustrates the inadequacy of Buckeye Wind's proposed alternative (which would only account for up to a 25% drop in salvage value).

John Stamberg testified that if a surety bond is to be required as decommissioning financial assurance, it should be set at twice the net decommissioning cost in order adequately to buffer against escalating demolition costs or fluctuating scrap values. Stamberg Dir., UNU Exh. 27A at 15. A more conservative approach would be to require a performance bond rather than offer it as an option. A performance bond would eliminate the need for decommissioning cost estimates and minimum bond values altogether. *Id.* at 14. Whichever approach the Board settles upon, however, must be determined to be adequate to protect against reasonably-anticipated fluctuations in net decommissioning costs.

2) If Buckeye Wind is permitted to use a surety bond for financial assurance, the bond must be payable to the Board. In its revisions to Condition M, the Staff has dropped its requirement that the bond be payable to the Board. Staff Opening Brief at 31. No reason is given for this change, although it may relate to the inclusion of an option for a performance bond. *Id.* However, if a surety bond remains an option for financial assurance, it is important that the bond be payable to the Board in order to facilitate the Board's effective enforcement of the decommissioning requirements. Stamberg Dir., UNU Exh. 27A at 16.

3) Financial assurance for decommissioning should be required upon commencement of construction, not in the first year of operation. While the UNU Intervenors have shown the wisdom of such an approach (UNU Intervenors’ Opening Brief at 98), neither the Staff nor Buckeye Wind have shown how that approach would impose “undue financial hardship” on Buckeye Wind. *E.g.*, Doss, Tr. Vol. IX 2097.

4) The Staff should be required to consult with the County Engineer in connection with the selection of an independent consulting engineer. The Staff states that it is not opposed to such consultation but that it does not believe such an additional condition is necessary. However, given the benefits of County involvement (UNU Intervenors’ Opening Brief at 95-96) and the apparent willingness of the Staff, there is no reason not to include such a requirement in the Certificate.

5) Buckeye Wind should be required to inform the Board prior to the expiration of its bond, in order to ensure it does not lapse. As discussed in UNU Intervenors’ Opening Brief (at 96-97), a bond will be of little use to the State or the host community if it is allowed to lapse before decommissioning is completed. The Board should ensure that a mechanism is in place to ensure that decommissioning is completed before lapse of the bond.

IV. CONDITIONS ALLOWING POST-CERTIFICATE ALTERATIONS, INFORMATION SUBMISSION, AND SIMILAR MEASURES WOULD UNFAIRLY UNDERMINE THE PURPOSE OF THE EVIDENTIARY HEARING AND RELIEVE BUCKEYE WIND OF ITS BURDEN OF PROOF.

Finally, the UNU Intervenors object to a number of the Staff’s recommended conditions that provide for post-certificate submission and approval of information about important aspects of the Project, or that require post-certificate measures that may alter the location of turbines. Such conditions include the following:

- (8) (e), (f), (h), (i), and (j): Post-certificate review of final electric collection system plan, tree clearing plan, geotechnical report, fire protection and medical emergency plan, and noise complaint resolution procedure;
- (14) Development and implementation of post-construction avian bat mortality survey plan approved by Staff and ODNR Division of Wildlife;
- (16) Development of Habitat Conservation Plan and receipt of Incidental Take Permit with regard to Indiana bats;
- (33) Post-certificate submission of maximum potential distance for blade shear event and formula used to calculate that distance;
- (36) Applicant is to meet all recommended and prescribed FAA and Ohio Aviation Office requirements to construct;
- (40) Post-certificate vertical Fresnel zone analysis;
- (46) Post-certificate submission of adjusted location for Turbine 57; and
- (50) Post-certificate identification of turbine model that has been selected.

Buckeye Wind has also proposed the following similar certificate conditions to which the UNU Intervenors object:

- (31) Post-certificate meeting between Applicant and Staff to discuss shadow flicker monitoring, testing, and remedies (Applicant's Opening Brief at 15);
- (45) Allows post-certificate relocation of Turbine 70 under certain conditions (*id.* at 16);
- (55) Requires notification of Staff as soon as turbine model is selected and submission of relevant information that would assure Staff that the turbine impacts would not exceed those associated with the three models listed in the Application (*id.* at 17).

The UNU Intervenors object to all of these conditions because they defer important Project information, siting considerations, and compliance/mitigation measures until after the Certificate is presumably issued. The Staff and Buckeye Wind would have the Board issue a certificate for this Project before all information relevant to R.C. § 4906.10(A) has been presented and considered. This is an administrative variant of the adage, “Shoot first, ask questions later.”

Such an approach poses significant problems on a number of levels. Several of the conditions (*e.g.*, 45, 46) would allow turbines to be relocated after the Certificate is issued, based on information not presented at the public information meeting, in the Application, or at the hearing. In other cases, the conditions defer steps (such as the Habitat Conservation Plan and Incidental Take Permit) that should be taken before a Certificate is issued for the Project, since the deferred steps may affect the configuration of the Project and the siting of turbines. A significant number of these conditions (*e.g.*, 8, 14, 16, 31, 33, 40, 50, 55) allow for deferral of important information on key issues—project design, shadow flicker, noise, and impacts on wildlife, aviation, and telecommunications--that were debated at length by the parties and witnesses at the evidentiary hearing.

If this is to be allowed, it calls into question the purpose and the fairness of the three-week hearing in which all of the intervenors participated at considerable cost and effort. These conditions would relieve Buckeye Wind of its burden of proof in the evidentiary hearing, would permit the arbitrary circumvention of the rights of public notice and participation set forth in R.C. Chapter 4906, and would deprive the intervenors of procedural due process. For these reasons, the Board should not approve the above-referenced conditions as post-certificate requirements. Rather, the Board should require that all of the measures in question be

completed, submitted, and/or approved prior to certification. Furthermore, the evidentiary hearing should be reopened as appropriate to allow for full evidentiary exchange by all parties regarding all of this new information.

V. CONCLUSION

The Staff has observed, “Because of the magnitude of this project and the potential impacts in and around the proposed project area, the implementation of mitigation and, when possible, avoidance measures is critical to minimize impacts.” Staff’s Opening Brief at 14. Yet despite professing to be receptive to new information, in the end the Staff has ignored reasonable mitigation and possible avoidance measures, deferring to whatever the Applicant wants to do.

The Board should not issue a Certificate based on the current state of the Application, because it contains inadequate information to provide an informed basis for the Certificate.

These deficiencies include the following:

- Lack of credible information about the distance that wind turbines can throw ice.
- Lack of credible information about the distance that wind turbines can throw their blades.
- The background noise study uses erroneous techniques to calculate background noise and must be redone, or the Application must use the results of Richard James’ background sound measurements.
- The noise model fails to account for the five dBA margin of error in modeling, and has other errors described in the UNU Intervenors’ opening and reply briefs, and must be revised to make it accurate.
- The noise model must identify the wind turbines that are line sources, and recalculate the noise impacts from those turbines.

- Lack of information to quantify the air emissions that the Project's wind energy would avoid by replacing electricity from coal-fired power plants, including lack of information about the emission factor used to calculate emissions from the coal-fired power plants, the energy mix of power sources that will be displaced by the Project, and the wind data and other information needed to calculate the Project's capacity factor.
- A quantification of the taxes that the Project will pay, to substantiate Buckeye Wind's claims about the economic benefits of the Project.
- Inadequate information about bird and bat populations in the Project area due to limited surveys.
- Not including the information and deliverables listed in Section IV of this reply brief.

In light of these deficiencies, the Board should return the Application to Buckeye Wind for supplementation and reopen the hearing record to consider the new information provided in the amended application.

If the Board decides to issue a Certificate despite the Application's inadequacy, it should include the following conditions in the Certificate to protect the public in addition to any others that are requested in the UNU Intervenors' opening and reply briefs:

- The Applicant shall not allow any turbine to rotate when ice is on any of its blades.
- The sound level from the turbines shall not exceed 34 dBA at the property line of any property owned by a person whose land is not being occupied by turbines in the facility.

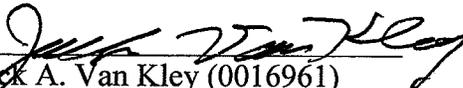
Where sound levels are greater than 34 dBA, the Applicant shall submit a mitigation plan for Staff review and approval to reduce sound levels below 34 dBA, and shall implement the mitigation plan as approved.

- The dBC operating immissions (as L_{Ceq}) for turbine noise at the receiving property line of a person whose land is not being occupied by turbines in the facility shall not be more than 20 dB above the measured dBA (as L_{A90}) pre-construction long-term background sound level + 5 dB.
- The Applicant shall not construct any wind turbine closer than 1.25 miles from the property line of any property owned by a person whose land is not being occupied by turbines in the facility. The Applicant shall submit a report to the Staff identifying the wind turbines that are line sources, and shall not construct any line source wind turbine closer than 2.0 miles from the property line of any property owned by a person whose land is not being occupied by turbines in the facility.
- The Applicant shall not install any model of wind turbine that produces more noise than the Repower MM92 turbine model that was evaluated in the Applicant's noise model.
- The approved turbines are subject to mitigation after construction, up to and including removal, if they exceed 10 hours per year of shadow flicker at any non-participating receptor, including homes, other buildings, and land, owned by a person whose land is not being occupied by turbines in the facility.
- The Staff shall investigate any complaint about noise, shadow flicker, or other issues that it receives about the facility and address any meritorious complaints. Upon the Staff's request, the Applicant shall provide the Staff with the funding necessary to retain and pay the Staff's own consultant to investigate any complaint about noise, shadow flicker, or other issue that the Board or the Applicant has received about the facility and to identify solutions to any complaints that the Staff determines to have merit. The Applicant shall implement any such solutions to resolve the complaints.

- The Applicant shall forward a detailed record of each complaint about noise, shadow flicker, or other issues it has received about the facility to the Staff and a description of the measures taken to address the complaint.
- Due to aviation hazards, the Applicant shall not construct turbines 19, 29, 46, 48, 50, 57, 58, 60, 61, 62, and 63.
- The conditions in the Certificate should contain the revisions and additions to the provisions for protecting Indiana bats described on pages 62-67 of the UNU Intervenors' opening brief.
- The Applicant shall not cut down or harm any trees in which bats have been known to roost or nest.
- The Applicant shall offer the attached Property Value Protection Agreement (currently attached as Exhibit A to the UNU Intervenors' opening brief) to all nonparticipating landowners within three-quarters mile of any turbine and shall enter into this agreement with any such landowner who consents to the agreement.
- No cameras shall be mounted on any turbines.
- The Applicant shall provide a bond to Champaign County adequate to reimburse the county for damage to roads caused by construction of the Project.
- The conditions in the Certificate should contain the revisions and additions to its decommissioning requirements described on pages 91-98 of the UNU Intervenors' opening brief.

The UNU Intervenors appreciate the time that the ALJs, and soon, the Board, will spend considering the issues raised in the parties' submissions, and urge them to issue a Certificate that adequately protects the community.

Respectfully submitted,



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CERTIFICATE OF SERVICE

I hereby certify that, on February 1, 2010, a copy of the foregoing Post-Hearing Reply

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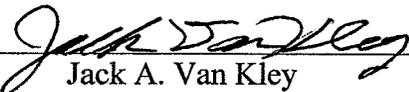
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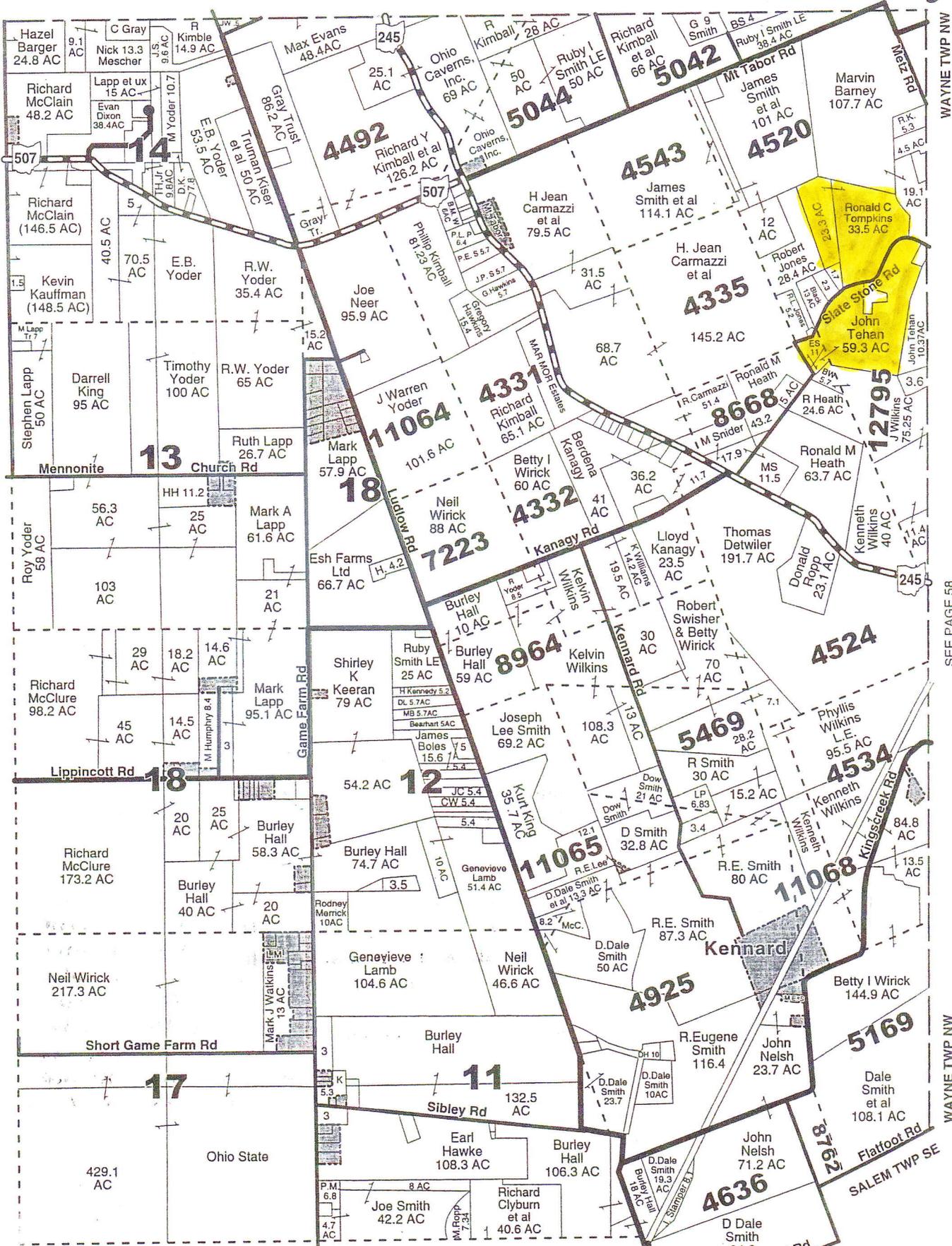
Dear Ms. Seymour,

You had requested other information concerning the Indiana Brown Bat population and the Everpower/Buckeye Wind project. It has been rumored that there are other caves south of Ohio Caverns that are actually in Champaign County. They would certainly be within 5-10 miles of the current Buckeye Wind project and are surrounded by Everpower lease holders in Salem Twp. Champaign County. One of the locations is on a lease holders property.

As far as I know these caves have not been explored scientifically but are well known by the teenage population in the area as a number of them have been in the caverns. I have heard that there are caves that could be winter habitat for Indiana Bats on the Tehan and Tompkins properties on Slate Stone Rd.Salem Twp. in Champaign County. Certainly it is possible that there are other caves located in the surrounding area that I am not aware of. I have enclosed a map showing the location of the two properties.

In addition we have many shag bark hickory trees scattered throughout Eastern Champaign County that would provide perfect summer habitat for Indiana bats. Considering the fact that another Wind Company located the bats within the footprint of the Everpower/Buckeye project perhaps a more expanded study of the area should be undertaken.

Sincerely, Diane McConnell



SEE PAGE 58

WAYNE TWP NW

WAYNE TWP SE

BABCOCK & BROWN

**Draft Recommendations for Logan County Wind Energy Project
By U.S. Fish & Wildlife Service
Reynoldsburg FO and R3 RO**

Potential Minimization Measures

1. No clearing of forest cover for turbines or supporting infrastructure, including access roads.
2. Turbine sitings need to be such that the turbines do not cast a shadow on primary Indiana bat maternity colony locations.
3. Night-time shutdowns of turbines at wind speeds of ≤ 7 meters/second (Behr et al. 2008, presentation at Bat and Wind Energy Cooperative, Austin, TX; Brown and Hamilton, 2006; E. Arnette, 2008, presentation at NWCC research conference) from April 1 through November 15 (Ohio Monitoring protocols) annually. Timing for using this cut-in speed would be from sunset to sunrise (K. Lott, 2008 M.S. Thesis, J. Fiedler 2004, M.S. Thesis).
4. Note: the cut-in speeds and time restrictions recommended above are the agencies' best estimate based upon current data. Actual operations will be adjusted up or down using adaptive management to maximize production while ensuring that take does not exceed the numbers allowed in an ITP.
5. Turbine design should be such that cut-in speeds can be controlled remotely.
6. Use of phased-in approach to project development. For example, construct and operate 1/5 of total planned turbines with post-construction mortality surveys conducted at all turbines for the first 2 years.
7. Use results to justify adding turbines to the project area and post-construction monitoring to evaluate wildlife impacts.
8. Adaptive management would be used to make changes in operations. E.g. for increasing or decreasing cut-in speeds or timing of onset and end and then monitoring between different treatments.
9. If the project were delayed for a year or more, it is probable that we would have additional studies to base our recommendations upon.

Required Monitoring

1. Number of turbines to search: Ohio protocol: less than or equal 10 all, 11-40 search half with a minimum of ten; greater than 40, $\frac{1}{4}$ searched with a minimum of 20
2. Searches for bat fatalities should be conducted daily from April 1 through November 15.
3. Searchers should utilize trained dogs for the searches
4. Area under turbines should be kept mowed or in low crops (e.g. alfalfa or soy beans).

5. If the carcass cannot be identified to species, DNA should be used to determine species.
6. Unidentified bats would be classified as Indiana bats.
7. Each carcass of a female Indiana bat would be considered as two fatalities from April 1 through August 15.
8. Bias corrections for scavengers and for searcher efficiencies should include 75 to 100 trials each per season, if any (M. Huso, 2008, presentation at NWCC Wind Wildlife Research Meeting VII).
9. Monitoring would continue as described above for two years after any adjustments (e.g. cut-in speeds) to the operation?
10. After the monitoring period required above has been reached, monitoring would still need to be continued throughout the life of the ITP, but at a reduced rate.

Potential Mitigation

1. The current forest cover in the project area would be maintained with an appropriate age and species structure.
2. Habitat corridors would be created and/or maintained.
3. If timber is harvested, it would be replaced at a ratio of ???
4. Additional good habitat could be protected through acquisition or easements.
5. Development of an outreach program to help the public understand protective needs of Indiana bats.