**BEFORE**
**THE OHIO POWER SITING BOARD**

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| **In the Matter of the Power Siting Board's Review of Rule 4906-4-08 of the Ohio Administrative Code** | **)**<br>**)**<br>**)** | **Case No. 16-1109-GR-BRO** |

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**REPLY COMMENTS OF UNION NEIGHBORS UNITED, JULIA F. JOHNSON, AND ROBERT AND DIANE McCONNELL**

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## I. COMMENTS

Union Neighbors United, Inc., Julia F. Johnson, and Robert and Diane McConnell (collectively "UNU") submit the following reply comments in response to the initial comments filed in this docket on or before October 24, 2016. UNU's reply comments are organized in the order that the issues are presented in proposed sections 4906-4-08 and -09.

### A. Rules 08(D)(1), (3), (4)(d) – Landmark mapping, recreation and scenic areas, and visual impact of facility

UNU supports the proposed 10-mile mapping distance for land and water recreation areas, recreational trails, scenic rivers, scenic routes or byways, registered landmarks, and recreational and scenic areas. UNU also supports the requirement for visual impact evaluation for all such resources. Visual impact analyses in certificate applications to date have shown that wind turbines can be visible well beyond five miles; such visibility will only increase with the trend toward larger turbine size. A 10-mile mapping distance is appropriate to identify all of the foregoing resources that may be affected by wind energy facilities, and to ensure that the impacts on such resources are adequately evaluated consistent with existing Rule 4906-4-08(D)(4)(d)

(which requires visual impact analysis, within a 10-mile radius, of "resources . . . that are valued specifically for their scenic quality").

Although the Mid-Atlantic Renewable Energy Coalition (MAREC) complains about the added burden of the expanded mapping and visual impact analysis requirements, MAREC overlooks the fact existing Rule 4906-4-08(C)(1)(a) reduced the regional land use mapping requirement from 5 miles to 1 mile. *Compare* Ohio Adm. Code 4906-17-08(C)(1). This reduction should amply offset any additional burden associated with mapping landmarks, cultural resources, and recreational areas at a 10-mile radius.

**B. <u>Rule 08(E)(2)(c)(ii) – Agricultural information</u>**

MAREC (at 10) urges the Board to loosen the proposed requirement that the applicant repair damaged field tile systems at the applicant's expense. Instead, MAREC proposes that the Board revise proposed Rule 4906-4-08(E)(2)(c)(ii) to excuse the applicant from that duty if "otherwise agreed to by the landowner."

Damage to field tile systems affects not only leaseholders, but also upgradient neighboring landowners. There is no assurance that a repair agreement between a wind developer and a participating landowner would protect the interests of neighboring landowners whose drainage may be affected by the wind power project. Furthermore, the proposed rule does not, as suggested by MAREC, affect any leaseholder's "right to manage the property." It merely specifies that the applicant is responsible for the associated costs of repair. Thus, the proposed language protects both the participating landowner and neighboring landowners.

**C. <u>Rules 4906-4-08(D)(4)(e), -09(C)(6) – Aesthetics and recreational land use – photographic simulations</u>**

MAREC (at 14) objects to the proposed requirement in proposed Rule 4906-4-09(C)(6) that photographic simulations be utilized in visual impact analyses. However, photographic

simulations have been used routinely in wind energy facility applications before the Board, and it is reasonable and consistent with industry practice to require their use. MAREC has offered no evidence that this change would increase substantially the cost of compliance; to the contrary, the fact that its members have submitted applications to the Board utilizing photographic simulations suggests there is no such economic burden. To the extent proposed Rule 4906-4-08(D)(4)(e) continues to allow for the use of "artist's pictoral sketches," it should be revised to eliminate that option.

6011 Greenwich Windpark argues (at 5) that the required vantage points for visual simulations in proposed Rule 4906-4-09(C)(6) be changed from every three square miles within the project area to every five miles around the project perimeter. Any requirement measured from the facility perimeter may prove inadequate to demonstrate visual impacts within the facility footprint, particularly in the case of large facilities. UNU does not oppose the addition of specifications for visual simulations around the perimeter of a facility, but it is important that the rule retain a requirement for sufficient simulations from vantage points within the facility footprint. UNU endorses the Board's proposed requirement for interior simulations.

**D. <u>Rule 09(A)(5)– Change, reconstruction, alteration, or enlargement</u>**

MAREC (at 10-14) objects to the expedited procedure for "modifications" as defined in the proposed rule, noting that R.C. Chapter 4906 "does not contain a process for the filing of a modification to a certificate."

On that point, UNU agrees with MAREC. There is nothing in R.C. Chapter 4906 that provides for a "modification" of a certificate as distinct from an "amendment" of a certificate. Any change to a certificate constitutes an amendment subject to the application requirements of

R.C. 4906.06(E). Proposed Rule 4906-4-09(A)(5)(b) would be unlawful insofar as it purports to excuse certain certificate changes from the statutory amendment process.

Furthermore, UNU strongly disagrees with MAREC's further suggestion (at 11) that the proposed rule is somehow a "new obstacle . . . requiring all nonsignificant changes and modifications to be filed with the Board." Board approval of certificate changes is nothing new. According to R.C. 4906.06(E), <u>any</u> change, nonsignificant or not, must be submitted for approval pursuant to the Board's rules governing amendment applications. *See also* Admin. Code 4906-3-11. It is simply untenable for MAREC to imply that a developer has the right to deviate from the requirements of a certificate, without Board review or approval, because the developer feels that the change is "nonsignificant" or meets the criteria for a "modification." This is particularly troubling because, as pointed out by 6011 Greenwich Windpark (at 4-5), the proposed definition of "modification" is ambiguous.

**E. <u>Rules 09(D) and (D)(1), (2), (6), and (8)-(9) – Wildlife protection</u>**

UNU disagrees with the following statement in MAREC's initial comments (at 15-16):

> *This rule sets forth requirements for the avoidance and minimization of impacts to wildlife species. Initially, MAREC notes that wind developers currently work very closely with governmental agencies and stakeholders to ensure that any concerns regarding wildlife are addressed and minimized to the greatest extent practical. Therefore, MAREC agrees that the concept set forth in new Rule 09(D) which spells out the requirements and procedure for working with the state agencies is a necessary part of any project.*
>
> *However, it is also important to ensure that the requirements appropriately focus on the purpose behind the regulation, which is to preserve and protect wildlife species, with particular requirements for those that are listed as threatened or endangered species. Furthermore, MAREC recommends that the rules be revised to reflect the Board's jurisdiction over only state power siting matters. As with the state regulatory agencies, wind developers also work closely with federal regulatory agencies on federal wildlife issues. However, due to the different requirements and threatened and endangered species included in the federal and state regulations, MAREC submits that it [sic] any reference to the federal regulatory requirements*

*should be removed from the Board's rules. This revision will then appropriately focus on the issues within the Board's jurisdiction and will acknowledge that issues under the jurisdiction of the federal regulatory agencies must be addressed at the federal level. With this in mind, MAREC recommends the following revisions to the new wildlife protection requirements in Rule 09(D).*

MAREC attempts a divide-and-conquer approach with the above comment. The State of Ohio has jurisdiction over the wildlife of the State, including wildlife belonging to species listed under the federal Endangered Species Act. The federal protections add a second layer of protection for those species but do not supplant State protections or jurisdiction that is consistent with the federal law. Moreover, the State plays an important role in protecting federally listed species within the State. See USFWS, *Interagency Policy Regarding the Rile of State Agencies in ESA Activities*, https://www.fws.gov/endangered/laws-policies/policy-state-agencies.html ("The Services recognize that, in the exercise of their general governmental powers, States possess broad trustee and police powers over fish, wildlife, and plants and their habitats within their borders. Unless preempted by Federal authority, States possess primary authority and responsibility for protection and management of fish, wildlife, and plants and their habitats. . . . State agencies, because of their authorities and their close working relationships with local governments and landowners, are in a unique position to assist the Services in implementing all aspects of the [Endangered Species] Act.").

The Board has no reason to, and should not, remove references to federal regulatory requirements in the Board's rules. The Board is correct to require that applicants adhere to federal as well as State laws as a condition of State permit approvals.

**F. <u>Rule 09(D) – State listed species</u>**

UNU disagrees with the following statement in MAREC's initial comments (at 16):

> *The list of species in Ohio includes not only threatened and endangered species, but species of special concern and special interest, etc.19 State law protects approximately 200 bird species. It is important that the regulations provide for focused review and protection of state threatened or endangered species. If the list of species identified for protection is expanded in the rules, it would be nearly impossible for wind developers to comply and the expense of compliance would be untenable.*
>
> *Therefore, MAREC recommends the following language be included in the first paragraph of this rule to clarify the intent of the requirements so that the intent of the rules is clearly communicated:*
>
> > *…The applicant shall satisfy the following requirements to avoid and minimize ~~mitigate~~ impacts to ~~federal or~~ state listed species. State listed species, for purposes of this rule, include wildlife species listed as threatened or endangered in the state of Ohio.*

As explained above, the Board is correct to require that applicants adhere to both federal law and State law as a condition of State permit approvals. The Board is also correct to require protection of both federally listed and State listed species. MAREC's argument that the Board rule should omit federally listed species lacks any reasonable basis.

In addition, although "wildlife species listed as threatened or endangered in the state of Ohio" are of special importance and may receive higher priority, there is no reason to omit the other categories of Ohio's listed species – species "of concern," of "special interest," extirpated, and extinct – from the rule's protections. *See* ODNR Pub. 5356 (R0316), *Ohio's Listed Species: Species That re Considered to be Endangered, Threatened, Species of Concern, Special Interest, Extirpated, or Extinct in Ohio* (Update Mar. 2016), http://wildlife.ohiodnr.gov/portals/wildlife/pdfs/publications/information /pub356.pdf. There are 25 extant mammal species and 64 extant bird species on the list. *Id*. at 3. Species of concern and of special interest should receive protection under the rule for a very simple reason: these species are on the State list because proactive protections are needed to ensure that these species do not become threatened or endangered. That is, removing them from the rule would defeat the reason for putting them on the list in the first place. Wind developers will be able to comply with mandated protections for

all such listed species so long as the protections are practicable and feasible and geared to the priorities for protection.

We agree that impacts to listed species should be "avoided and minimized." But impacts should also be compensated through mitigation to the extent that further avoidance and minimization is not possible or feasible.

## G. Rule 09(D)(1) - Alternative proposals

UNU disagrees with the following statement in MAREC's initial comments (at 17):

> *MAREC agrees that all reasonable science-based recommendations from the agencies should be addressed by the developer in a judicious manner. However, understanding that experts in any given wildlife field could differ on the proper resolution of any issue and how a particular recommendation should be addressed, MAREC requests that new Rule 09(D)(1) be revised, as follows, to afford the Board flexibility to propose and adopt its own recommendation, and to allow applicants to submit alternative proposals through the appropriate forum:*
>
> *…If the ~~United States fish and wildlife service, the~~ Ohio department of natural resources division of wildlife, or board staff identify any recommendations for the avoidance of impacts to specific species, the applicant shall describe how it shall consider and reasonably address all recommendations ~~in a manner satisfactory to the applicable wildlife management agency~~.*

There is no reason why the Board should not solicit the input of USFWS on issues of wildlife protection. In fact, to ignore such input, as MAREC appears to recommend, would be reckless. Coordination between the Ohio DNR and USFWS is essential for safe development of wind power in the State.

In addition, the "applicable wildlife management agency" is the appropriate government entity to develop and assess "science-based recommendations." Of course scientific experts will sometimes disagree on scientific recommendations; that is the nature of science and of decision-making based on the best available science. Such disagreements are usually resolved effectively within the agency-led scientific and peer review process. Yet MAREC appears to be using

scientific uncertainty as an excuse to short-circuit and bias the process of best-available-science decision-making. MAREC is attempting to force the Board to choose between agency science and MAREC's science. Such a plan is unworkable and will likely result in scientifically questionable or unsubstantiated Board decisions. The Board should as a rule give appropriate deference to the expert agencies when it comes to scientific recommendations and assessments.

Finally, we do not disagree in principle with allowing wind power developers, through their expert scientists, to weigh in on the scientific process led by the appropriate agencies. Agency collaboration with outside scientists is normal. But the expert agencies should be in control of the process of developing scientific recommendations and of assessing whether the applicant's responses to such recommendations are satisfactory.

## H. Rule 09(D)(2) – Reporting period for state listed species

UNU disagrees with the following statement in MAREC's initial comments (at 17):

> *MAREC believes it is essential that this rule appropriately identify the proper time period and procedure to be followed when a species is sighted. Not all species are readily identifiable and wildlife experts are not available onsite during construction. Furthermore, it is highly unlikely that a living animal will remain stationary long enough for a wildlife expert to arrive on site and identify the species. Therefore, MAREC recommends that this provision be revised to focus on the event that a carcass of a state listed species is encountered and identified.*
>
> *While wind developers process this identification as expeditiously as possible, it is important that this rule recognize the need for positive identification and establish a reasonable time frame for notification to the Board staff. Therefore, MAREC recommends that the language be revised, as follows, to clarify when the reporting period begins:*
>
>> *<u>If the carcass of a state listed species is encountered and positively identified during construction</u>, t~~T~~he applicant shall contact the board staff within <u>one business day to indicate how further impacts were avoided</u> ~~twenty-four hours if federal or state listed species are encountered during construction activities~~.*
>>
>> *Construction activities that could adversely impact the identified <u>listed</u> species ~~plants or animals~~ <u>may</u> ~~shall~~ be halted <u>at the request of the board staff</u> until an reasonable ~~appropriate~~ course of action has been agreed*

> *upon by the applicant, board staff, and other applicable administrative agencies….*

MAREC proposes that wind energy companies be permitted to wait to identify the presence of listed species until after the animal or animals belonging to such species have been killed. In other words, they propose to use ignorance or scientific uncertainty to justify dispensing with the logical and reasonable requirement to proactively identify species occurring on the site of a wind power facility. Although this strategy would likely cost less and make life easier for wind energy companies, it is contrary to the principle of proactive protection for listed wildlife. Therefore, UNU recommends the following:

> If a member of a federal or state listed species is encountered or sighted and either tentatively or positively identified during construction activities, the applicant shall contact the Board staff within 24-hours of such encounter or sighting to indicate how impacts can be avoided.
>
> Construction activities that could adversely impact the identified members of the listed species shall be halted, with or without the request of the Board, until a reasonable and appropriate course of action has been agreed upon by the applicant, Board staff, and other applicable administrative agencies….

## I. <u>Rule 09(D)(6) – Clearing and monitoring habitat</u>

UNU disagrees with the following statement in MAREC's initial comments (at 18):

> *As proposed, this new rule requires the applicant to conduct a mist-netting survey before tree clearing, in the event habitat for bird or bat species must be cleared outside of the seasonal cutting dates. However, it should be noted that mist-netting may not always be appropriate. In fact, depending on the size of the wooded areas, other types of monitoring may be more appropriate. Thus, MAREC recommends that, to ensure that the most appropriate and effective monitoring is conducted, this new requirement be revised as follows:*
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> > *…If any <u>habitat for</u> ~~federal or~~ state listed <u>bird or bat</u> species of ~~bird or bat habitat trees are found~~ that cannot be avoided <u>is required to be cleared</u> outside the seasonal cutting dates ~~specified by the Ohio department of natural resources~~, the applicant shall conduct <u>biological monitoring in the area to be cleared</u> <u>a mistnetting survey</u> prior to such cutting.*

UNU proposes that the simplest and best language for this provision would be the following:

> If federal or state listed species of bird or bat, or trees or other habitat of significance to such species, are found on the applicable site at a time not within the permissible seasonal cutting dates specified by the Ohio Department of Natural Resources, and the applicant proposes to cut such trees or compromise such habitat outside these seasonal cutting dates, and such cutting cannot be avoided, then the applicant shall conduct appropriate biological surveying and monitoring in the area prior to such cutting. The appropriate biological surveying and monitoring may include a mist netting survey if other methods of surveying and monitoring are potentially less effective for detecting the presence, location, and movements of the relevant species.

## J. <u>Rule 09(D)(7) – Mitigation plan during operation</u>

UNU disagrees with the following statement in MAREC's initial comments (at 18):

> *This proposed rule appropriately calls for a plan if mortality to birds and bats reaches a certain level. However, in an effort to help clarify this requirement, MAREC suggests that what constitutes "significant mortality" be clearly defined. This clarification will assist wind developers and the agencies determine when action is necessary. Therefore, MAREC recommends that the following revision be made to this new rule:*
>
> > *…During operation of the facility, if ~~significant~~ mortality ~~occurs~~ to any <u>state listed</u> birds or bats <u>is determined to be at a level likely to impact regional populations, and is not already adequately mitigated through other permitting measures</u>, the applicant will develop a mitigation plan <u>or adaptive management strategy</u>.*

First, what constitutes "significant" mortality is not simply a level of mortality that is "likely to impact regional populations." This would allow local populations to be driven to extinction so long as the regional population persists. This strategy would certainly be unlawful for species listed under the federal Endangered Species Act, and would also potentially be unlawful for State-listed species. In any case, such a definition of "significant" mortality would place species at an unacceptably high risk of local extinctions.

Second, a mitigation and adaptive management plan should be developed and put in place before a significant adverse impact occurs. If the trigger for development of a mitigation and adaptive management plan depends on such an impact having already occurred, the agency and applicant will be playing a dangerous game of catch-up and will risk not being able to control the unfolding of such impacts.

Third, MAREC's phrase "and is not already adequately mitigated through other permitting measures" is redundant with the notion of "significant" mortality. If a plan for avoidance, minimization, and compensation of impacts is "adequate," then by implication the impact would not be "significant."

Fourth, MAREC proposes the phrase "the applicant will develop a mitigation plan *or* adaptive management strategy." However, an adaptive management plan is not a replacement for, or an alternative to, a mitigation plan. An adaptive management plan tells us what to do if the measures in the avoidance-minimization-compensation plan *do not work as expected*. An adaptive management plan does not tell us how we are going to avoid, minimize, and compensate for impacts in the first instance. Therefore, an avoidance-minimization-compensation plan must be developed along with an adaptive management plan.

## K. Rule 09(D)(8) – Curtailment of turbine blades

UNU disagrees with the following statement in MAREC's initial comments (at 19):

> *Initially, MAREC notes that there is a great deal of migratory season variability among bird species. Moreover, curtailment has not proven effective for birds during as this new rule seems to imply. Therefore, MAREC recommends that birds not be included in the curtailment strategy, but be handled in a manner that has proven effective for birds.*
>
> *With the elimination of curtailment for birds, this rule can appropriately focus on bats and their fall migratory season. Accordingly, MAREC recommends the following revision to this new rule:*

> *…the applicant shall describe its curtailment strategy for fall bat migration ~~plans for maintaining turbine blades in a stationary or nearly stationary stance during low wind speed conditions at night during bird and bat migratory seasons~~.*

First, with respect to bats, studies have shown that bats are at risk of impacts from turbine blades during spring, summer, and fall. Although the fall season may be the time during which the risk is greatest and the largest number of bats are predicted to be impacted, the study data show that impacts to both migrating and resident bats are significant during spring and summer as well. Bats are in need of an appropriate level of protection during all seasons. With regard to bats, the scientific data do not support limiting a curtailment strategy to the fall season alone. [We will supply the relevant supporting data at the Board's request.]

Second, even if turbine curtailment is not as effective for protecting birds as for protecting bats, this does not imply that curtailment has no effect on birds. This is a subject area of high uncertainty. The effectiveness of turbine curtailment on reducing bird collisions with turbine blades likely depends on factors such as weather, turbine height, and proximity to migratory routes, ridge lines, and migration stopover sites. *See, e.g.*, American Bird Conservancy, *To Save Birds, Change Rules on Wind Turbines* (July 24, 2015), https://abcbirds.org/to-save-birds-change-rules-on-wind-turbines/ ("[a] recent report from the U.S. Fish and Wildlife Service calls into question the wind industry's assertion that birds fly well above wind turbines' rotor blades. Using radar, researchers examined fall migration at two locations in Michigan. They found that the greatest density of birds and bats migrating at night occurred from 300 to 500 feet above ground. That's almost directly at hub-height for the new generation of giant turbines."); NWCC, *Wind Turbine Interactions with Birds, Bats, and their Habitats: A Summary of Research Results and Priority Questions* (Spring 2010), https://www1.eere.energy.gov/wind /pdfs/birds_and_bats_fact_sheet.pdf (explaining factors

potentially influencing turbine-related impacts to birds). Thus, turbine curtailment should be retained as a strategy for reducing turbine-related impacts to birds, especially in circumstances in which such impacts are most likely. In all cases, however, this curtailment strategy should be supplemented with other protection measures.

## L. Rule 09(D)(9) – Mitigation plan during construction

UNU disagrees with the following statement in MAREC's initial comments (at 19):

> *As stated previously, MAREC works closely with the regulatory agencies to ensure that all reasonable and appropriate measures are taken in the event there is an impact to wildlife species. Should a significant event occur during construction, MAREC agrees that a mitigation plan or adaptive management strategy should be developed and vetted with the agencies. To that end, MAREC recommends the following clarification be included in this new rule:*
>
> > *If construction activities result in significant adverse impact to threatened or endangered wildlife species, ~~then mitigation measures may be prescribed to~~ the applicant will develop a mitigation plan or adaptive management strategy.*

First of all, a mitigation and adaptive management plan should be developed and put in place before a significant adverse impact occurs. If the trigger for development of a mitigation and adaptive management plan depends on such an impact to have already occurred, the agency and applicant will be playing a dangerous game of catch-up and will risk not being able to control the unfolding of such impacts.

Second, we believe that a mitigation and adaptive management plan should be developed by the appropriate agency in consultation with the applicant. At the very least, the agency will need to assess the technical and economic feasibility of any plan for that particular applicant. But allowing the applicant to develop the plan independent of the agency would be unreasonable and unsound.

Third, MAREC proposes the phrase "the applicant will develop a mitigation plan *or* adaptive management strategy." However, an adaptive management plan is not a replacement for a mitigation plan. An adaptive management plan tells us what to do if the measures in the avoidance-minimization-compensation plan *do not work as expected*. An adaptive management plan does not tell us how we are going to avoid, minimize, and compensate for impacts in the first instance. Therefore, an avoidance-minimization-compensation plan must be developed along with an adaptive management plan.

Fourth, a mitigation and adaptive management plan should not be limited to listed species of wildlife. Any undue impact of wind power facilities on any wildlife species requires attention and response by the agencies and the Board.

**M. <u>Rule 09(F)(1)-(2)—Noise</u>**

MAREC has submitted several comments on the noise standards proposed in OAC 4906-4-09(F)(2). Initially, MAREC objects to the Board's use of the term "noise" and asks the Board to use only the term "sound," contending that "noise" has "a negative connotation that indicates loud, harsh, or disturbing sound." But make no mistake about it, the sounds imposed on the public by wind turbines are loud, harsh, and disturbing. The semantic niceties offered by the wind industry cannot disguise that fact.

Acoustic engineers define "noise" as "unwanted sound." Since no one desires the sounds from a wind turbine, not even the turbine's host landowner, "noise" is the most appropriate term for turbine emissions in this rule.

MAREC also argues that measuring turbine noise at nonparticipating neighbors' property lines instead of at their inhabited residences "is not only illogical but an incredible encroachment on the property rights of landowners who wish to host wind turbines." While MAREC

dramatically declares that a noise standard for property lines would "eviscerate" wind development in Ohio, it offers no evidence to support that assertion. Moreover, under Ohio law, it is axiomatic that a landowner's right to use his/her property is restrained by a neighbor's equal right to use his/her property. The owner of a turbine site does not have the right to host a turbine that unreasonably harms a neighbor's use of property. Contrary to this basic principle of property rights, MAREC asks the Board to adopt a noise standard that sacrifices the nonparticipating neighbors' rights to use whatever land is not currently occupied by an inhabited residence. Such an invasive standard would subject neighbors to loud, harsh, and disturbing noise while they are trying to recreate in their yards, maintain their gardens, or do anything else outdoors. It would prevent nonparticipating neighbors from developing their land for new uses, such as opening new recreational facilities or building new homes there. It would make the neighbors' properties unmarketable. Essentially, the application of a noise standard only to inhabited residences would trap the neighbors inside their homes. Consequently, a reasonable noise standard must apply not only to the neighbors' homes, but also to their land.

The foregoing observation also applies to the Ohio Environmental Council's (OEC's) opposition to noise standards at the property line. In addition, the OEC claims that "[c]redible, peer-reviewed science is largely resolved on this issue, finding no public health risk based upon the sound measurements previously used in certificates issued by the Ohio Power Siting Board from the sensitive receptors." To the contrary, science has recently demonstrated that wind turbine noise levels above 35 dBA cause serious health problems. This information is explained in the report of Richard James that UNU submitted on June 9, 2016, which is attached hereto for the Board's convenience. Moreover, whether or not turbine noise causes direct health problems, a noise standard is necessary at the property line to prevent serious annoyance and discomfort to

non-participating neighbors who are trying to use their yards, gardens, and land for the purposes they have every right to enjoy on their own land.

MAREC contends that a standard of five A-weighted decibels (dBA) over the average ambient Leq is a strict standard. It is not. The Board's proposed five dBA standard is based on the ambient Leq, while it should be based on the ambient L90 in accordance with professional engineering practices. Responsible acoustical engineers do not use the Leq to quantify ambient sound.[1] Basing the standard on the ambient Leq is a deceptive way to make the standard look reasonably protective when it is not. The Board's noise standards should be five dBA over the L90 ambient level.

MAREC requests language revisions that would base the five dBA nighttime standard on the average ambient level instead of a site-specific ambient level and would base the five dBA daytime standard on the greater of the average ambient level or the site-specific ambient level. However, ambient sound levels can vary substantially throughout an area, where some properties might be exposed to road traffic and other sound sources but other homes may not be exposed to these sounds. Using an areawide ambient level to measure compliance in the quieter portions of the area will allow the facility to impose noise on the quieter areas that could be substantially higher than five decibels above the actual ambient sound level in those quieter areas. This could create intolerable noise conditions in the quieter areas. Consequently, UNU urges the Board to use only the ambient sound level at the location of the neighbor's property, not an areawide average, to measure compliance during daytime and nighttime.

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[1] This point was emphasized by the testimony of David Hessler, EverPower's acoustical engineer in the Champaign Wind (Buckeye Wind II) proceeding before the Board, who admitted that the Leq is "not normally used to quantify background sound for this kind of application," and that he has never used the Leq for background, except for BW II. *See* Page 794 of the transcript in OPSB Case No. 12-0160-EL-BGN.

MAREC suggests that local officials be authorized to waive the Board's restrictions against noisy construction at night when the community is trying to relax or sleep. The community should not be exposed to annoyance or sleep deprivation at night, and the Board should reject the wind industry's attempt to undercut this basic protection for the community. In addition, the Board should decline to allow construction at night that does not "involve substantial sound increases above ambient levels." Determining whether an increase in sound is "substantial" is highly subjective and susceptible to abuse. The Board should allow only the nighttime construction that does not raise the community's sound above the ambient level, so that neighbors can relax and sleep at night.

MAREC proposes that wind developers be required to conduct background sound measurements at only one location in each 3,000 to 10,000 acres of the project area for a minimum of 10 days. That is, its member wind companies want to monitor at only one location in every 4.7 square miles to 15.6 square miles. Such sparse coverage would not produce results that are representative of the entire project area. In contrast, EverPower's subsidiary had monitoring stations for the Buckeye Wind I project at nine locations in 36 square miles, which is an average of one station for every 2560 acres. Thus, MAREC's proposal to dilute the monitoring density is out of line with the wind industry's prior practices.

More importantly, MAREC's recommendation for measuring ambient sound is contrary to accepted acoustic engineering practice as provided in ANSI Standards S12.9, Part 3 and S12.100-2014 for projects of this nature. Contrary to MAREC's proposal, a sound recording device should not be left unattended for 10 days, because then the engineer cannot tell whether the sound recording has been contaminated with sounds that are uncharacteristic of the area (e.g., a singing bird perched near the recorder, or a curious person who decides to take a close look at

the recorder). Instead, an acoustic engineer should record sounds for at least 30 minutes per location while observing the recording device and ensuring that the recorded sounds are characteristic of the ambient level in the studied area. The measurements should be taken during the quietest time of the 24-hour day at each non-participating neighbor's property at a location used by the neighbor for quiet relaxation (e.g., the back yard). If a non-participating neighbor does not provide the acoustic engineer with access to the neighbor's property, the measurements should be made as close to the neighbor's property line as feasible. Rather than allowing applicants to submit unscientific and inaccurate ambient sound measurements, the Board should require applicants to submit ambient measurements that comply with the acoustic engineering standards in ANSI Standards S12.9, Part 3 and S12.100-2014.

MAREC advocates the use of the protocol in ISO 9613 to model noise from wind turbines. While this model is a better tool for estimating wind turbine noise than any other model, it consistently underestimates wind turbine noise by at least three dBA. ISO Standard 9613-2 cautions that this model has an uncertainty factor of at least three decibels for noise sources 30 meters in height or shorter. The uncertainty factor for taller noise sources, such as wind turbines with a tip height of 492 feet (150 meters) or higher, is even larger. ISO 9613-2 was not intended for wind turbines, and its limitations make its use for noise sources taller than 30 meters questionable. Consequently, the Board should require applicants to add at least three dBA to the results of their ISO 9613 modeling to more accurately estimate the turbines' noise.

Applicants who model turbine noise should also be prohibited from reducing the models' estimates of turbine noise by applying a ground absorption coefficient. The ground absorption coefficient should be employed only where soft soil can be expected to absorb a portion of a project's noise. This is not the case for wind turbines in Ohio, which operate during the winter

when frozen ground prevents noise absorption and when the absence of insects and leaf rustle makes turbine noise more likely to be heard. The Board should forbid applicants to use the ground absorption coefficient in their ISO 9613 models or any other model used to predict turbine noise.

MAREC argues that noise should be modeled and measured at residences only within 4000 feet of a turbine. However, turbine noise is invasive at distances far greater than 4000 feet, as community experiences with turbine noise in Ohio and elsewhere have regrettably proven. Noise should be modeled and measured for all non-participating properties located within 1.25 miles of a turbine.

## N. <u>Rule 09(H)(1) – Shadow Flicker</u>

It is entirely appropriate for the Board's shadow flicker standards to apply anywhere on a nonparticipating property, not simply to occupied structures. As aptly expressed in the reply comments of Sen. Bill Seitz (at 1), "All residents of homes in nonparticipating properties are not bedridden invalids; I dare say that few are. They enjoy their yards, farms, and woods and are entitled to the full use thereof free of excessive noise and shadow flicker."[2] There is no reasonable basis to regulate shadow flicker impacts on one's residence or other structure, yet ignore the same impacts on that individual's use and enjoyment of the remainder of his or her property.[3]

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[2] UNU endorses the reply comments of Senator Seitz in their entirety.

[3] The Ohio Environmental Council claims (at 5) that "shadow flicker has been shown to cause no harmful health effects to individuals whose homes receive thirty hours of shadow flicker or less per year." The study cited by the OEC makes no such claim. Rather, that study states, "There is limited scientific evidence of an association between annoyance from prolonged shadow flicker (exceeding 30 minutes per day) and potential transitory cognitive and physical health effects." Mass. DEP, *Wind Turbine Health Impact Study: Report of Independent Expert Panel* at 56, *reprinted at* http://www.mass.gov/eea/docs/dep/energy/wind/turbine-impact-study.pdf. The study provides not prove that that lower levels of exposure "cause no harmful health effects" as the OEC claims. Health effects aside, the OEC completely ignores the extreme nuisance that shadow flicker can cause day after day. *See, e.g., Matter of Application of Buckeye Wind*, OPSB No. 08-666-EL-BGN, Direct Testimony of Larry Wunsch and UNU Exh. 30 (video).

The proposed 30-hour standard is not, as MAREC suggests (at 24), a "global industry standard," nor is the Board's proposed shadow flicker standard "well more restrictive than industry norms." To the contrary, as explained in UNU's initial comments (at 8-9), the 30-hour standard is unduly lax compared to current U.S. and European standards.

As it does on the subject of noise, setbacks, and certificate modifications, MAREC warns that the Board's proposed shadow flicker rule will be "catastrophic" to the wind industry.[4] MAREC Initial Comments at 24. But again, MAREC offers no evidence whatsoever to support that claim.

## O. MAREC Mischaracterizes the Requirements, and Overstates the Impact, of the Common Sense Initiative

MAREC asserts that the Board's proposed rules are contrary to the Common Sense Initiative because the rules have "negative consequences" on the wind industry. *E.g.*, MAREC Initial Comments at 22, 24. Of course, the Common Sense Initiative does not grant wind developers immunity from "negative consequences." It merely requires the Board, when promulgating rules, to determine the impact of the rule on small business and to "balance the critical objectives of the regulation and the costs of compliance by the regulated parties." Executive Order 2011-01K. Although MAREC repeatedly invokes the Common Sense Initiative as a shield against the Board's proposed rules, it offers no concrete evidence that compliance costs will increase.

[4] MAREC compares the effect of the 30-hour shadow flicker standard against the statutory setback set forth in R.C. 4906.20(B)(2)(a). But since the Board is already applying a 30-hour flicker exposure guideline on a case-by-case basis, *e.g.*, Application of Champaign Wind, No. 12-160-EL-BGN, Order and Certificate at 88, Cond. 47, MAREC's comparison provides no support for its claim (at 24) that the proposed rule would be nearly twice as restrictive as either the statutory setback or the Board's current *ad hoc* practice. Shadow flicker travel and duration is a function of geometry, topography, weather, and astronomy; point of measurement is not likely, on average, to have the impact MAREC claims.

The Common Sense Initiative is intended to ensure that small business is not overburdened by unnecessary regulations. While it is important that all businesses, irrespective of size, enjoy regulations which are fair and promote competition, Executive Order 2011-K is clearly focused on small business:

1. The Lieutenant Governor is granted the authority to develop and implement the "Common Sense Initiative," a process for independently evaluating the economic impact of agency rules and regulations on *small businesses in Ohio*. Specifically, the Lieutenant Governor is authorized to:

   * * *

   b. Hire the appropriate staff to ensure the effectiveness of this Office. While the Lieutenant Governor shall maintain the flexibility to determine its structure, one component of the CSI Office should serve solely to *receive the viewpoints of and advocate for the small business community* on proposed and existing regulations.

   c. Develop a workable definition of what is a "small business" for the purpose of implementing the Common Sense Initiative.

   d. Develop a process for requiring agencies to determine the real or potential *economic impact on small businesses from existing or proposed regulations*. . . .

   f. Serve as a *point of contact for small businesses* throughout Ohio to voice concerns about the implementation of any rule or regulation. . . .

   g. Conduct, or contract to have conducted, an inventory of existing agency rules and regulations to *determine those that economically impact small businesses*. . . .

   h. Establish a Small Business Advisory Council which will offer the lieutenant Governor the perspectives of the small business community and provide guidance into the mission and direction of the CSI Office.

   i. Make recommendation regarding the restructuring of and/or the responsibilities of divisions or functions of State government that relate to small businesses that duplicate the authorities granted to the Lieutenant Governor by this Executive Order. . . .

Executive Order 2011-01K (emphasis supplied).

MAREC and its members are not small businesses. The companies and/or organizations participating in MAREC's comments include: Avangrid Renewables, Inc.; EverPower Wind Holdings, Inc.; Apex Clean Energy, Inc.; American Wind Energy Association; Capital Power Corporation; and EDP Renewables North America. Avangrid's 2016 third quarter earnings report can be found at http://www.avangrid.com/InvestorRelations/earningsreleases.html. Alberta, Canada-based Capital Power has a market capitalization of $2B, and reports its 2016 third quarter earnings at http://www.capitalpower.com/InvestorRelations/Documents/2016%20Q3%20Investor%20Fact%20Sheet.pdf . EDP Renewables North America, EverPower Wind Holdings, Inc. and Apex Clean Energy, Inc. are privately held entities whose financial reports are not available to the public. Staff correctly notes that the certificating of an electric generation facility or wind farm in Ohio are not activities typically undertaken by an entity that would be defined as a small business.

Furthermore, Executive Order 2011-K emphasizes that regulations are essential for good governance and protection of the public in the State of Ohio:

> WHEREAS, regulations play an important role in promoting fair competition, protecting the public health, and implementing the intent of the General Assembly. All of Ohio benefits from regulations that are in the public interest and are enforced properly. Protecting the public is always first and foremost, and regulatory compliance increases when regulations are easier to understand and to follow.

Protecting the public is one of the principle objectives of rulemaking for the siting of industrial wind turbines. UNU agrees with the Governor's proclamation in his Executive Order establishing the CSI that regulations must "protect the public first and foremost." Though MAREC repeatedly invokes the CSI in support of objections to alleged business impacts, in each case the rule in question has been proposed for the protection of the public.

Although MAREC's comments were submitted on behalf of major companies with global operations, those comments fail to acknowledge what is commonly accepted by most industrial wind turbine manufacturers: Industrial wind complexes can and do have adverse impacts to the public and to wildlife. As one recent example, renewable insurer GCube[5] estimated that there are "roughly 50 turbine fires every year —one for every 6,000 machines — and the problem is growing and getting more expensive."[6] The following excerpt from the October 2016 issue of industry publication, Recharge, is instructive:

> The cost of fires is actually increasing compared to five years ago, mainly due to the arrival of larger turbines," Sharma tells Recharge." And shockingly: "Researcher Anne Dederichs at Sweden's SP Technical Research Institute, says: "There is virtually no research in this area, and no rules or recommendations for fire safety design of wind turbines exists, which is surprising, given its importance." …He reveals that GCube has actually sought legal advice as it knows of a couple of turbine models that are particularly prone to fires. "Unfortunately the industry is not ready to hear that because it is libelous, embarrassing, and of course dangerous," he says.

*Id.*

To the extent that the proposed rules seek to balance the needs of Ohio families and property owners with the development of renewable energy, there is no justification for MAREC's desire to override the protection of the public in the interest of industrial wind development.

## II. CONCLUSION

Union Neighbors United appreciates the Board's consideration of these reply comments as it finalizes Rules 4906-4-08 and -09.

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[5] http://www.gcube-insurance.com/en/

[6] http://www.rechargenews.com/wind/1185510/turbine-fires-a-burning-issue-for-the-industry

Respectfully submitted,

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## CERTIFICATE OF SERVICE

I hereby certify that, on November 8, 2016, a copy of the foregoing comments was filed with the docketing division's e-filing system, which will electronically serve notice of the filing of this document on the following parties:

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# ATTACHMENT

# TESTIMONY OF
# RICHARD R. JAMES, INCE

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**Testimony to the Ohio Power Siting Board About the Need for Noise Standards to Protect the Health and Well Being of Persons Living Near Utility Scale Wind Turbines**

**By: Richard R. James, INCE**
**June 9, 2016**

My name is Richard James. I am testifying today by submitting written testimony that is being read into the record by Jack Van Kley on behalf of Union Neighbors United (UNU), Robert and Diane McConnell, and Julia Johnson.

The Ohio Power Siting Board ("Board") has previously accepted my testimony as an expert witness on noise from wind turbines in two prior hearings on applications for certificates for the Buckeye Wind I and II wind projects. A summary of my qualifications is attached.

The Board's rules currently contain no objective standards for controlling noise from wind projects. To adequately protect the public, the rules should contain the following requirements:

1. Nonparticipating neighbors should be exposed to no more than 35 decibels of A-weighted ("dBA") noise from the wind turbines at any time. Studies conducted in Europe near operating wind projects have demonstrated that, for sound levels from wind turbine operations of 35 dBA, roughly 10% of the population experiences annoyance. Annoyance increases rapidly for higher sound levels. These studies show that the specific character of wind turbine noise makes turbines more annoying than other common community noise sources. The World Health Organization classifies this type of annoyance as an adverse health effect. As I will explain later in this testimony, recent evidence demonstrates that noise levels of 35 dBA, and even lower levels, pose risks of adverse health effects for a significant part of the community's population.

2. Nonparticipating neighbors should be exposed to no more than 50 decibels of C-weighted ("dBC") noise from the wind turbines at any time. Setting a limit of 50 dBC addresses the low frequency sound emitted by utility scale wind turbines. This low frequency sound propagates further than mid and high frequency sounds common from other community noise sources. It also is not blocked by the walls, windows, and roofs of homes resulting in rumble and roar sounds being heard inside homes. This a special problem at night in quiet bedrooms. As utility scale wind turbines increase blade lengths to extract more power, they also shift the sound emissions from the mid frequency range, where dBA is a useful metric, into the lower

frequency range which dBA does not measure. Thus, modern utility scale wind turbines may have lower dBA emissions, but it is only because the sound energy is shifted to lower frequencies. The dBC scale addresses this deficiency.

Studies of low frequency noise emitters such as gas turbine powered utilities have shown that in suburban communities the threshold for complaints due to low frequency sounds is 60 dBC. To account for the fact that rural communities are at least 10 dBC quieter than urban and suburban communities, a reduction of 10 dBC sets the appropriate threshold at 50 dBC.

3. The rule should require measurements of continuous background sound (also called residual sound) quantifying the ambient sound level for nonparticipants' properties. These measurements should be taken at locations on nonparticipating properties representing the places where quietness is expected. For example, test sites should be in a non-participant's back yard, or at a property line not near any local noise sources but near a proposed wind turbine location. They should be conducted in accordance with applicable ANSI/ASA standards for measurement. Measurements of background noise from participating properties, or at test sites where localized noise(s) produce sounds that are not representative of the quiet locations on nonparticipating properties, call into question the objectivity and applicability of the data upon which decisions will be made.

   For purposes of determining continuous background levels (residual), the measurements should be based on the L90 metric specified for rural communities in ANSI/ASA S12.100 (2014) *Methods to Define and Measure the Residual Sound in Protected Natural and Quiet* Residential *Areas*. The measurement procedure should also comply with the protocols for measuring the continuous background sound (residual) specified in ANSI/ASA S12.9 (2013), Part 3: *Quantities and Procedures for Description and Measurement of Environmental Sound – Part 3: Short-term Measurements with an Observer Present*. ANSI standards are accepted by the federal government and courts as the basis for objective measurements of sounds in a community. Use of the L90 sound level when measured according to the two standards is universally acknowledged in the acoustical engineering profession as the appropriate metric for measuring continuous background sound. The OPSB should adopt regulations requiring their use.

   The L90 measurement quantifies the level of the continuous background sound that is available to mask turbine noise for conditions when it is most disturbing. The L90 is the sound level exceeded during 90% of the measurement period. It is also the sound level

during the quietest 10% of the time during the test. It represents the sounds one hears from distant noise sources when other short term or localized sounds are not present. Quantifying it by measurements conducted in accordance with the two ANSI/ASA standards provides an objective assessment of how much sound is present when winds at the ground level are calm, such that there is no leaf rustle or other wind induced noise.

It is the continuous background sound that provides masking for the wind turbine noise during periods of calm ground level winds and sufficient upper level winds to power wind turbines at or above nominal operating speeds. These conditions occur frequently, approximately one out of three nights, during warm weather periods. By removing brief noise spikes, the L90 metric eliminates short-term noise spikes that serve no purpose for masking the sound of a new noise source. These requirements are necessary to protect public health from adverse effects due to nighttime sleep disturbance.

4. When wind turbine noise exceeds the continuous background sound by more than 5 dBA, annoyance is known to occur. Adverse health effects increase, such as those caused by night time sleep disturbance, or long-term high levels of stress hormones. A nonparticipating neighbor should not be exposed to noise from a new source that is more than 5 dBA above the existing continuous background sound levels (residual). As explained above, masking of a new noise source by the continuous background sounds prevents sleep disturbance and other effects, such as annoyance.

   It is generally accepted by acousticians and other professionals involved in land use planning and public health that a new noise source should not increase the background sound in a community by more than 5 dBA. Measurements I have performed in rural Ohio on properties adjacent to where wind turbine towers were proposed show L90 sound levels at night are in the range of 25 to 30 dBA. A new project of any type -- wind turbine utility or other -- should be limited to not increasing the pre-existing continuous background by more than 5 dBA.

5. The standards described above should apply at the boundary line of the properties owned by nonparticipating neighbors, not merely at neighboring residences. Otherwise, the wind turbine noise prevents the nonparticipating neighbors from full use and enjoyment of their properties without permission.

6. A utility scale wind turbine should be located no closer than 1.25 miles from a nonparticipating property. I have held this opinion since my first paper on wind turbine

noise in 2008. It is based on the distance needed to prevent wind turbine low frequency sound, which propagates farther than mid and higher frequency sound, from causing rumbling or roaring sounds in homes during sleeping hours. These sounds penetrate the walls and roofs of homes, causing an imbalanced spectrum inside, especially in bedrooms, at night when people need quiet for undisturbed sleep. I will provide more justification for this setback later in my testimony.

7. As the Board is aware, wind energy developers often plan their facilities in phases, while in other cases, one developer's facility is proposed in or near the location of another developer's facility. In order to assess the cumulative impacts from multiple facilities, it is critical that the noise assessment take into account the impacts from other existing, proposed, or planned wind power facilities in addition to impacts from the facility proposed by a new application.

All of these requirements are necessary to protect the health of the more vulnerable members of the community who will be living near or inside the footprint of the utility scale wind project.

New medical and epidemiological evidence from a study sponsored by the Canadian government under a grant from Health Canada shows the need for these standards. This research was performed in 2013 by Dr. David Michaud and a research team including Canadian government officials. At the time of the study, the research team and Health Canada stated that the data from the study would be made available for public and peer review. The public assumed that the data would be shared with the public before the research team announced its conclusion, so that other acoustical and medical professionals would have the opportunity to comment on the data. However, the Canadian government withheld the data from the public, and thus evaded the critical review of other professionals.

The research team concluded that they found no association between adverse health symptoms and turbine noise below 46 dBA. However, recent disclosures of data from the study have shown this conclusion to be inaccurate. The Health Canada study did not use a proper control group for its statistical analysis of the prevalence rates. The research team primarily interviewed people who lived within 5 kilometers of a utility scale wind turbine, asking them to fill in a questionnaire describing adverse health symptoms they experienced. The questionnaire and interview protocols were developed to avoid bias against wind turbines. When this information was analyzed as described in a paper later issued by the research team, they did not use the prevalence rates for the general population as their control group. The researchers should have compared the prevalence rates for the adverse health effects experienced by the study subjects with the prevalence rates for

symptoms reported by the general population. Instead, they compared the number of adverse health effects afflicting persons exposed to louder turbine noise with the number of adverse health effects experienced by persons who lived far enough from the projects that they were inaccurately assumed not to be experiencing adverse health effects from wind turbine noise (modeled levels of <25 dBA). Based on this improper statistical analysis, the research team announced that people exposed to high levels of wind turbine noise (40 to 46 dBA) did not experience significantly more adverse health symptoms than people exposed to lower turbine noise levels (25 to 40 dBA). This was a result of using an improper group as its study control group, not an accurate finding from the data that would have resulted from using a proper control group. The conclusion is unreliable.

This fallacy in the study's methodology was recently discovered when data from the study was revealed in a paper published by Dr. Michaud, one of the researchers, in the March 2016 issue of the Journal of the Acoustical Society of America (JASA). It was entitled: "*Exposure to wind turbine noise: Perceptual responses and reported health effects.*" This paper has provided me and others with the research team's statistics on the adverse health symptoms reported by people exposed to turbine noise. While in summary form rather than being raw data, this information is still useful in understanding what the study did reveal about wind turbine noise and adverse health effects.

By using these summaries, I was able to compare the numbers of medical symptoms reported in this study by the persons exposed to turbine noise with the number of symptoms experienced by a proper control group consisting of the general population. This comparison shows that people living as far as three or more miles from turbines are experiencing significantly more adverse health effects than the general population. Thus, the conclusions that sound levels of 40 to 45 dBA are safe that is being promoted by Health Canada and its research team is inaccurate.

The data revealed in the paper shows that adverse health effects occur even at sound levels of 35 dBA and lower. This new medical study data shows it is necessary to keep turbine noise below 35 dBA on nonparticipating neighbors' properties and establish an adequate setback between turbines and neighbors to protect public health and safety. In addition, Dr. Michaud's paper concludes that the annoyance reported by persons exposed to more than 35 dBA of turbine noise is significantly higher than those exposed to lower noise levels.

Dr. Michaud's paper presents the findings of a cross-sectional epidemiological study carried out between May and September of 2013 in Southwestern Ontario and Prince Edward Island consisting of 1238 randomly selected participants living between 0.25 and 11.22 kilometers (820 feet and just

under seven miles) from utility scale wind turbines. The study divided the interviewees into categories based on the distance of their residence from a turbine.

I have attached Table V from the Health Canada study to my comments. Table V shows the prevalence rates for a series of health related questions and symptoms as the percentage of the questionnaire respondents who had the symptom for each of several categories of noise (in dBA) ranging from as high as 46 dBA to under 25 dBA. The paper correlates these symptoms to the distances between their homes and the nearest wind turbines. Four of these categories correlate sound levels at the test subject's home with the following turbine noise levels:

Table 1

| Sound level of turbine outside home | Distance to nearest turbine |
|---|---|
| 14.6-30.9 dBA | 2-5 km |
| 26.3-40.4 dBA | 1-2 km |
| 31.8-43.6 dBA | 0.55-1 km |
| 37.4-46.1 dBA | ≤0.55 km |

The first few entries on Table V are for symptoms that have been defined by Dr. Nina Pierpont as part of the spectrum of symptoms related to Wind Turbine Syndrome. They include:

- migraines,
- dizziness,
- tinnitus, and
- health-worse-this-year-than-last.

I have created Table 2 (below) showing these symptoms using the prevalence rates in Table V for each of the sound level categories. The categories for sound levels 30-35 dBA, 35-40 dBA and 40-46 dBA represent the people living within 2 kilometers (1.25 miles) of the nearest wind turbine. See Table 1 above for a correlation of the sound levels and distances. These distances are greater than what has typically been employed by the Board for turbine setbacks. Those setbacks are inadequate to protect public health, especially the health of the more vulnerable members of the community including seniors, children, and people with other medical conditions.

For these types of symptoms, the prevalence rates in the general population (in other words, people not exposed to wind turbine noise) are shown in the column just to the right of the health effect column. This data represents the prevalence rates that should have been used as the control group for this type of study. The prevalence rates for the general population are shown in the second column of Table 2 for each of the symptoms.

In the table below, boldfaced fonts are used to show where the prevalence rates from the exposed population in the Health Canada wind turbine study data exceed the rates in the general population by more than 2%. Even for people who are exposed to turbine sound levels of 30 to 35 dBA, the prevalence rates of the symptoms are as much as double that of the general population.

## Table 2

| Increased Rates of Adverse Health Effects for People Living Within 2-3 Miles (3-5 km) of Wind Turbine Utilities | | | | | |
|---|---|---|---|---|---|
| | | Wind turbine noise (dBA) HC Models | | | |
| | | [25–30) | [30–35) | [35–40) | [40–46] |
| **Adverse Health Effect[1]** | **Prevalence Rate (%) General Population[2]** | **Prevalence Rates (%) from Health Canada Study of People living within 1000 feet to three (3) miles of Wind Turbines [3]** | | | |
| **Health worse than last year** | 15 | 12.6 | 15.1 | **17.3** | **21.8** |
| **Migraines** | 12 | **25.3** | **18.4** | **25.8** | **24.4** |
| **Dizziness** | 15 | 16.8 | **21.4** | **21.9** | **25.2** |
| **Tinnitus** | 10 | **18.9** | **23.4** | **24.8** | **23.2** |

[1] Prevalence Rate % for key Wind Turbine Syndrome Health Effects from Health Canada Study

[2] Prevalence Rate (%) for Non-Exposed General Population

Self-Reported Health: Canadian J. Of Public Health, Volume 98, No. 2, P. 154, K. Wilson et al, Table III
Dizziness: Dizziness-and-Balance.com
Migraines: Migraine Research Foundation
Tinnitus: Hearing Health Foundation

[3] From Table V of the Health Canada Study report entitled "Sample profile of health conditions," in the paper entitled: "Exposure to wind turbine noise: Perceptual responses and reported health effects," by D. S. Michaud et al, Health Canada, Journal Acoustical Society of America (JASA) 139 (3), March 2016.

**Boldfaced** type indicates that the prevalence rate for the exposed population exceeds that of the general population.

Typically, local governments have assumed that turbines are safe if they are located more than one kilometer from neighboring residences. At this distance, the turbine noise is expected to be 26 dBA or higher. See Table 1 above. However, Table 2 shows that the population exposed to noise that is 26 dBA and higher (i.e., at 1-2 km or 3280 feet to 1.25 miles) is vulnerable to more health problems.

Thus, the so-called "safe" distances are regions for concern. Moreover, the findings of the study for shorter setback distances (which are underlined and in bold in Table 1), where sound levels can be as high as 45 dBA, demonstrate a need for immediate action to prevent health impacts.

The data from this study dispels the argument that wind turbines will not cause health problems where they expose the population to sound levels of 40 to 45 dBA. It confirms the cautions of the acousticians and medical professionals who have been warning public agencies that permitted sound levels from wind turbines require lower limits than other common noise emitters. These warnings are confirmed by the paper's medical and epidemiological findings about the high prevalence of adverse health effects. These statistics show that one of every four people living closer than 1.25 miles from a wind turbine is at risk for adverse health effects, while one in five people who live near 1.25 miles from a turbine is at risk.

I trust that the Board and Staff will carefully consider this new evidence and understand that it is a clear demonstration that continuing current policies is causing harm to the public.

Thank you for the opportunity to present this information.

Sincerely,
E-Coustic Solutions LLC

Richard R. James, INCE

Table V from March 2016, JASA paper by Dr. Michaud for Health Canada
on
Exposure to Wind Turbine Noise, Perceptual Responses and Reported Health Effects

TABLE V. Sample profile of health conditions.

| | Wind turbine noise (dB) | | | | | | |
|---|---|---|---|---|---|---|---|
| Variable *n* (%) | <25 | [25–30) | [30–35) | [35–40) | [40–46] | Overall | CMH[a] *p*-value |
| n | 84[b] | 95[b] | 304[b] | 521[b] | 234[b] | 1238[b] | |
| Health worse vs last year [c] | 17 (20.2) | 12 (12.6) | 46 (15.1) | 90 (17.3) | 51 (21.8) | 216 (17.5) | 0.1724 |
| Migraines | 18 (21.4) | 24 (25.3) | 56 (18.4) | 134 (25.8) | 57 (24.4) | 289 (23.4) | 0.2308 |
| Dizziness | 19 (22.6) | 16 (16.8) | 65 (21.4) | 114 (21.9) | 59 (25.2) | 273 (22.1) | 0.2575 |
| Tinnitus | 21 (25.0) | 18 (18.9) | 71 (23.4) | 129 (24.8) | 54 (23.2) | 293 (23.7) | 0.7352 |
| Chronic pain | 20 (23.8) | 23 (24.2) | 75 (24.8) | 118 (22.6) | 57 (24.5) | 293 (23.7) | 0.8999 |
| Asthma | 8 (9.5) | 12 (12.6) | 22 (7.2) | 43 (8.3) | 16 (6.8) | 101 (8.2) | 0.2436 |
| Arthritis | 23 (27.4) | 38 (40.0) | 98 (32.2) | 175 (33.7) | 68 (29.1) | 402 (32.5) | 0.6397 |
| High blood pressure (BP) | 24 (28.6) | 36 (37.9) | 81 (26.8) | 166 (32.0) | 65 (27.8) | 372 (30.2) | 0.7385 |
| Medication for high BP | 26 (31.3) | 34 (35.8) | 84 (27.6) | 163 (31.3) | 63 (27.0) | 370 (29.9) | 0.4250 |
| Family history of high BP | 44 (52.4) | 49 (53.8) | 132 (45.5) | 254 (50.6) | 121 (53.8) | 600 (50.3) | 0.6015 |
| Chronic bronchitis/emphysema/COPD | 3 (3.6) | 10 (10.8) | 17 (5.6) | 27 (5.2) | 14 (6.0) | 71 (5.7) | 0.7676 |
| Diabetes | 7 (8.3) | 8 (8.4) | 33 (10.9) | 46 (8.8) | 19 (8.2) | 113 (9.1) | 0.6890 |
| Heart disease | 8 (9.5) | 7 (7.4) | 31 (10.2) | 32 (6.1) | 17 (7.3) | 95 (7.7) | 0.2110 |
| Highly sleep disturbed[d] | 13 (15.7) | 11 (11.6) | 41 (13.5) | 75 (14.5) | 24 (10.3) | 164 (13.3) | 0.4300 |
| Diagnosed sleep disorder | 13 (15.5) | 10 (10.5) | 27 (8.9) | 44 (8.4) | 25 (10.7) | 119 (9.6) | 0.3102 |
| Sleep medication | 16 (19.0) | 18 (18.9) | 39 (12.8) | 46 (8.8) | 29 (12.4) | 148 (12.0) | 0.0083 |
| Restless leg syndrome | 7 (8.3) | 16 (16.8) | 37 (12.2) | 81 (15.5) | 33 (14.1) | 174 (14.1) | |
| Restless leg syndrome (ON) | 4 (6.7) | 15 (17.4) | 27 (11.0) | 78 (17.3) | 28 (16.5) | 152 (15.0) | 0.0629[e] |
| Restless leg syndrome (PEI) | 3 (12.5) | 1 (11.1) | 10 (16.9) | 3 (4.2) | 5 (7.8) | 22 (9.7) | 0.1628[e] |
| Medication anxiety or depression | 11 (13.1) | 14 (14.7) | 35 (11.5) | 59 (11.3) | 23 (9.8) | 142 (11.5) | 0.2470 |
| QoL past month[f] | | | | | | | |
| Poor | 9 (10.8) | 3 (3.2) | 21 (6.9) | 29 (5.6) | 20 (8.6) | 82 (6.6) | 0.9814 |
| Good | 74 (89.2) | 92 (96.8) | 283 (93.1) | 492 (94.4) | 213 (91.4) | 1154 (93.4) | |
| Satisfaction with health[f] | | | | | | | |
| Dissatisfied | 13 (15.5) | 13 (13.7) | 49 (16.1) | 66 (12.7) | 36 (15.4) | 177 (14.3) | 0.7262 |
| Satisfied | 71 (84.5) | 82 (86.3) | 255 (83.9) | 455 (87.3) | 198 (84.6) | 1061 (85.7) | |

[a]The Cochran Mantel-Haenszel chi-square test is used to adjust for provinces unless otherwise indicated, *p*-values <0.05 are considered to be statistically significant.
[b]Columns may not add to total due to missing data.
[c]Worse consists of the two ratings: "*Somewhat worse now*" and "*Much worse now*."
[d]High sleep disturbance consists of the two ratings: "*very*" and "*extremely*" sleep disturbed.
[e]Chi-square test of independence.
[f]Quality of Life (QoL) and Satisfaction with Health were assessed with the two stand-alone questions on the WHOQOL-BREF. Reporting "*poor*" overall QoL reflects a response of "*poor*" or "*very poor*," and "*good*" reflects a response of "*neither poor nor good*," "*good*," or "*very good*." Reporting "*dissatisfied*" overall Satisfaction with Health reflects a response of "*very dissatisfied*" or "*dissatisfied*," and "*satisfied*" reflects a response of "*neither satisfied nor dissatisfied*," "*satisfied*," or "*very satisfied*." A detailed presentation of the results related to QoL is presented by Feder *et al.* (2015).

# Bio Materials for: Richard R. James, INCE

Mr. James is the Owner and Principal Consultant for E-Coustic Solutions, LLC, of Okemos, Michigan. He has been a practicing acoustical engineer for over 40 years. He started his career as an acoustical engineer working for the Chevrolet Division of General Motors Corporation in the early 1970s. His clients include many large manufacturing firms, such as, General Motors, Ford, Goodyear Tire & Rubber, and others who have manufacturing facilities community noise and worker noise exposure. In addition, he has worked for many small companies and private individuals. He has been actively involved with the Institute of Noise Control Engineers (INCE) since it's formation in the early 1970's and is currently a Member Emeritus.

His academic credentials include a degree in Mechanical Engineering (BME) from General Motors Institute, Flint Michigan (now Kettering Institute). He has been an adjunct Instructor to the Speech and Communication Science Department at Michigan State University from 1985 to 2013 and a adjunct Professor for the Department of Communication Disorders at Central Michigan University from 2012 through 2017. In addition, Mr. James served on the Applied Physics Advisory Board of Kettering Institute from 1997 to 2007.

Specific to wind turbine noise, he has worked for clients in over 60 different communities.

He has provided written and oral testimony in approximately 30 of those cases. He has also authored or co-authored four papers covering wind turbine noise topics including:

- Criteria for wind turbine projects necessary to protect public health (2008),
- Demonstrating that wind turbine sound immissions are predominantly comprised of infra and low frequency sound (2011), and
- A peer reviewed historical review of other types of low frequency noise sources with similar sound emission characteristics, such as large HVAC systems (fans) which caused noise induced Sick Building Syndrome and other noise sources that have known adverse health effects on people exposed to their sound. (2012).

He has been qualified as an expert in acoustics for hearings and court proceedings in several countries. Examples of recent qualifications are:

| Jurisdiction | Before | Qualified as: | |
|---|---|---|---|
| Ontario, CA (January 2014) | Ministry of Environment (MOE) and Environmental Review Tribunal (ERT) | Qualified to provide evidence on matters related to acoustics and noise control engineering and wind turbines | |
| Alberta, CA (Dec. 2013) | Alberta Utilities Commission (AUC) | an acoustical engineer and acoustician with expertise in the field of sound including noise, low frequency noise, sounds emitted from industrial wind turbines and human response to noise. | |
| Michigan, US | Michigan Circuit Court | 1. acoustician with expertise in measurement of wind turbine noise and its effects on people. (Dec. 2013)<br>2. acoustician qualified to opine that the plaintiff's symptoms were caused by the defendant's wind turbines. After special Daubert Hearing (Dec. 2013) | |

# BIOGRAPHICAL SKETCH

| NAME | POSITION TITLE | BIRTHDATE |
|---|---|---|
| Richard R. James | Principal Consultant, E-Coustic Solutions, LLC (2006- ) | 3/3/48 |

**ACADEMIC CREDENTIALS**

| INSTITUTION | DEGREE/POSITION | YEAR | FIELD |
|---|---|---|---|
| General Motors Institute, Flint, MI | B. Mech. Eng. | 1966-1971 | Noise Control Engineering |
| Michigan State University, East Lansing, MI | Adjunct Instructor | 1985-2013 | Acoustics and Effects of Noise on People |
| Central Michigan University, Mount Pleasant, MI | Adjunct Professor | 2012-2017 | Wind Turbine Noise and its Impact on People |

**RESEARCH AND PROFESSIONAL EXPERIENCE:**

Richard R. James has been actively involved in the field of noise control since 1969, participating in and supervising research and engineering projects related to control of occupational and community noise in industry. In addition to his technical responsibilities as principal consultant, he has developed noise control engineering and management programs for the automotive, tire manufacturing, and appliance industries. Has performed extensive acoustical testing and development work in a variety of complex environmental noise problems utilizing both classical and computer simulation techniques. In 1975 he co-directed (with Robert R. Anderson) the development of SOUNDTM, an interactive acoustical modeling computer software package based on the methods that would be later codified in ISO 9613-2 for pre and post-build noise control design and engineering studies of in-plant and community noise. The software was used on projects with General Motors, Ford Motor Company, The Goodyear Tire & Rubber Co., and a number of other companies for noise control engineering decision making during pre-build design of new facilities and complaint resolution at existing facilities. The SOUNDTM computer model was used by Mr. James in numerous community noise projects involving new and existing manufacturing facilities to address questions of land-use compatibility and the effect of noise controls on industrial facility noise emissions. He is also the developer of ONE*dB(tm) software. He was also a co-developer (along with James H. Pyne, Staff Engineer GM AES) of the Organization Structured Sampling method and the Job Function Sound Exposure Profiling Procedure which in combination form the basis for a comprehensive employee risk assessment and sound exposure monitoring process suitable for use by employers affected by OSHA and other governmental standards for occupational sound exposure. Principal in charge of JAA's partnership with UAW, NIOSH, Ford, and Hawkwa on the HearSaf 2000tm software development CRADA partnership for world-class hearing loss prevention tools.

1966-1970 Co-operative student: General Motors Institute and Chevrolet Flint Metal Fabricating Plant.

1970-1971 GMI thesis titled: "Sound Power Level Analysis, Procedure and Applications". This thesis presented a method for modeling the effects of noise controls in a stamping plant. This method was the basis for SOUNDTM.

1970-1972 Noise Control Engineer-Chevrolet Flint Metal Fabricating Plant. Responsible for developing and implementing a Noise Control and Hearing Conservation Program for the Flint Metal Fabricating Plant. Member of the GM Flint Noise Control Committee which drafted the first standards for community noise, GM's Uniform Sound Survey Procedure, "Buy Quiet" purchasing specification, and guidelines for implement-ing a Hearing Conservation Program.

1972-1983 Principal Consultant, Total Environmental Systems, Inc.; Lansing, MI. Together with Robert R. Anderson formed a consulting firm specializing in community and industrial noise control.

1973-1974 Consultant to the American Metal Stamping Association and member firms for in-plant and community noise.

1973 Published: "Computer Analysis and Graphic Display of Sound Pressure Level Data For Large Scale Industrial Noise Studies", Proceedings of Noise-Con '73, Washington, D.C.. This was the first paper on use of sound level contour 'maps' to represent sound levels from computer predictions and noise studies.

Nov. 1973 Published: "Isograms Show Sound Level Distribution in Industrial Noise Studies", Sound & Vibration Magazine

1975 Published: "Computer Assisted Acoustical Engineering Techniques", Noise-Expo 1975, Atlanta, GA which advanced the use of computer models and other computer-based tools for acoustical engineers.

1976 Expert Witness for GMC at OSHA Hearings in Washington D.C. regarding changes to the "feasible control" and cost-benefit elements of the OSHA Noise Standard. Feasibility of controls and cost-benefit were studied for the GMC, Fisher Body Stamping Plant, Kalamazoo MI.

1977-1980 Principal Consultant to GMC for the use of SOUND(tm) computer simulation techniques for analysis of design,

layout, and acoustical treatment options for interior and exterior noise from a new generation of assembly plants. This study started with the GMAD Oklahoma City Assembly Plant. Results of the study were used to refine noise control design options for the Shreveport, Lake Orion, Bowling Green plants and many others.

1979-1983 Conducted an audit and follow-up for all Goodyear Tire & Rubber Company's European and U.K. facilities for community and in-plant noise.

1981-1985 Section Coordinator/Speaker, Michigan Department Of Public Health, "Health in the Work Place" Conference.

1981 Published: "A Practical Method for Cost-Benefit Analysis of Power Press Noise Control Options", Noise-Expo 1981, Chicago, Illinois

1981 Principal Investigator: Phase III of Organization Resources Counselors (ORC), Washington D.C., Power Press Task Force Study of Mechanical Press Working Operations. Resulted in publishing: "User's Guide for Noise Emission Event Analysis and Control", August 1981

1981-1991 Consultant to General Motors Corporation and Central Foundry Division, Danville Illinois in community noise citation initiated by Illinois EPA for cupola noise emissions. Resulted in a petition to the IEPA to change state-wide community noise standards to account for community response to noise by determining compliance using a one hour $_{Leq}$ instead of a single not-to-exceed limit.

1983 Published: "Noise Emission Event Analysis-An Overview", Noise-Con 1983, Cambridge, MA

1983-2006 Principal Consultant, James, Anderson & Associates, Inc.; Lansing, MI. (JAA), Together with Robert R. Anderson formed a consulting firm specializing in Hearing Conservation, Noise Control Engineering, and Program Management.

1983-2006 Retained by GM Advanced Engineering Staff to assist in the design and management of GM's on-going community noise and in-plant noise programs.

1984-1985 Co-developed the 1985 GM Uniform Plant Sound Survey Procedure and Guidelines with James H. Pyne, Staff Engineer, GM AES.

1985-2013 Adjunct instructor in Michigan State University's Department of Communicative Sciences and Disorders from 1985-2013

1986-1987 Principal Consultant to Chrysler Motors Corporation, Plant Engineering and Environmental Planning Staff. Conducted Noise Control Engineering Audits of all manufacturing and research facilities to identify feasible engineering controls and development of a formal Noise Control Program.

1988-2006 Co-Instructor, General Motors Corporation Sound Survey Procedure (Course 0369)

1990 Developed One*dB(tm), JAA's Occupational Noise Exposure Database manager to support Organizational structured sampling strategy and Job Function Profile (work-task) approach for sound exposure assessment.

1990-1991 Co-developed the 1991 GM Uniform Plant Sound Survey Procedure and Guidelines with James H. Pyne, Staff Engineer, GM AES. Customized One*dB(tm) software to support GM's program.

1990-2006 Principal Consultant to Ford Motor Company to investigate and design documentation and computer data management systems for Hearing Conservation and Noise Control Engineering Programs. This included bi-annual audits of all facilities.

1993-2006 GM and Ford retain James and JAA as First-Tier Partners for all non-product related noise control services.

1993 Invited paper: "An Organization Structured Sound Exposure Risk Assessment Sampling Strategy" at the 1993 AIHCE

1993 Invited paper: "An Organization Structured Sound Exposure Risk Assessment Database" at the Conference on Occupational Exposure Databases, McLean, VA sponsored by ACGIH

1994-2001 Instructor for AIHA Professional Development Course, "Occupational Noise Exposure Assessment"

1996 Task Based Survey Procedure (used in One*dB(tm)) codified as part of ANSI S12.19 Occ. Noise Measurement

1995-2001 Coordinate JAA's role in HearSaf 2000tm CRADA with NIOSH, UAW, Ford, and HAWKWA

1997-2007 Board Member, Applied Physics Advisory Board, Kettering Institute, Flint, Michigan

2002-2006 Member American National Standards Institute (ANSI) Accredited Standards Committee S12, Noise

2006 Closed James, Anderson and Associates, Inc. (JAA) and founded E-Coustic Solutions (E-CS)

2006-Present Consultant to local communities and citizen's groups on proper siting of Industrial Wind Turbines. This includes presentations to local governmental bodies, assistance in writing noise standards, and formal testimony at zoning board hearings and litigation.

2008 Paper on "Simple guidelines for siting wind turbines to prevent health risks" for INCE Noise-Con 2008, coauthored with George Kamperman, INCE Bd. Cert. Emeritus, Kamperman Associates.

2008 Expanded manuscript supporting Noise-Con 2008 paper titled: “The “How To” Guide To Siting Wind Turbines To Prevent Health Risks From Sound”

2009 "Guidelines for Selecting Wind Turbine Sites," Kamperman and James, Published in the September 2009 issue of Sound and Vibration.

2010 Punch, J., James, R., Pabst, D., "Wind Turbine Noise, What Audiologists should know," Audiology Today, July-August 2010

2011 Jerry L. Punch, Jill L. Elfenbein, and Richard R. James, "Targeting Hearing Health Messages for Users of Personal Listening Devices," Am J Audiol 0: 1059-0889_2011_10-0039v1

2011 Bray, W., HEAD Acoustics, James, R., "Dynamic measurements of wind turbine acoustic signals, employing sound quality engineering methods considering the time and frequency sensitivities of human perception," invited paper for Noise-Con 2011, Portland OR

2012 James, R., "Wind Turbine Infra and Low Frequency Sound: Warning Signs that were not Heard," April 2012, Bulletin of Science, Technology and Society

2012 Appointed to position as Adjunct Professor in the Department of Communication Disorders at Central Michigan University.

**Professional Affiliations/Memberships/Appointments**

| | | |
|---|---|---|
| Research Fellow - Metrosonics, Inc. | | American Industrial Hygiene Association (through 2006) |
| National Hearing Conservation Association (through 2006) | | Institute of Noise Control Engineers (Full Member) |
| American National Standards Institute (ANSI) S12 Working Group (through 2006) | | Founder and Board Member of the Society for Wind Vigilance, Inc. |
| Adjunct Professor, CMU 2012-2017 | | Adjunct Instructor, MSU 1985-2013 |

**Summary of Court and Administrative Agency Cases**
**for Richard R. James, INCE Since 2006**
**Dec. 1, 2015[1]**

| Jurisdiction | Date | Case No. | Topic |
|---|---|---|---|
| Chatham Ontario, Kent Breeze Wind | February-11 | Hearing before Ontario Environmental Board of Review: Case No: 10-121/10-122 | Hearing on whether project complies with Ontario regulations to protect health under the Green Energy Act. |
| Town of Albany, VT | February-11 | Hearing before Public Services Commission, Docket No. 7628 | Hearing before PUC on application for permit by Green Mountain Power Corp. for Kingdom Mountain Wind, LLC. |
| State of Maine | July 7, 2011 | Hearing before the Maine Board of Environmental Protection | Hearing before the BEP on a Petition for Rule Change for Maine's Chapter 375 Noise Regulations to add specific Rules for wind turbine noise. |
| State of Michigan Circuit Court of Leelanau county | Nov. 8-10, 2011 | Michigan Circuit Court, Leelanau County. Case No: 11-8456-CZ | Complaint of Nuisance Noise and other effects of a 100kW Residential class wind turbine |
| Illinois, Bureau County, Friesland Farms, LLC, Pierson, Plaintiff, v. Big Sky Wind, LLC) | Dec. 30, 2011 (filed testimony) Feb. 1, 2012 Deposed | US District Court, Central District of Illinois, Peoria. Case No. 10-01232 | Complaint of noise annoyance and adverse health effects. Case to be heard in early 2013. |
| Escanaba Twp. (Gladstone MI) vs. Wells Lions Race Track | March 2012 field study and June 2012 report to town attorney | Township enforcement actions | Complaint of noise annoyance related to ice racing race track adjoining residentially zoned property. |
| Vermonters for a Clean Environment vs. U.S.D.A. Forest Service, | July 23, 2012 filed testimony for Appeal of Decision | US District Court, District of Vermont Civil Action No. 1:12-cv-73 | USFWS Failed to properly consider impact of Deerfield Wind Project on Aiken Wilderness Area in its Decision to Approve said project. |
| Intervenors opposing Application for Certification: Pursuant to RSA 162-H of ANTRIM WIND ENERGY, LLC | PFT and oral testimony presented Aug. 23, 2012. Additional oral testimony on Nov. 29, 2012. | State of New Hampshire Site Evaluation Committee. Docket No. 2012-01 | Application for Certification: Pursuant to RSA 162-H of ANTRIM WIND ENERGY, LLC. Testimony on behalf of North Branch Residents Intervenors Group, Abutting Property Owners Intervenors Group, and Katharine Elizabeth Sullivan. Case to be heard Oct. 2012. |
| Union Neighbors United, Intervenors opposing Application of Champaign Wind LLC before Ohio Power Siting Board | PFT and oral testimony presented Nov. 2012 | State of Ohio, Power Siting Board Case No: 12-0160-EL-BGN | Testimony on behalf of Union Neighbors United in opposition to 2nd Phase of Buckeye Wind project. Champaign County, Ohio. |
| Private lawsuit by Wiltzer family against Stoney Creek Wind Project, McBain, Michigan | Affidavits and other documents | Lawsuit pending | Testimony on behalf of family who has vacated their home as a result of a 2.5 MW wind turbine being operated at 1350 feet from their home. |
| Private Lawsuit by Zawadzki family vs. Noble Bliss Wind Park and Town of Eagle, New York | Affidavits, noise studies and other related testimony. | Before the State of New York, Supreme Court, Wyoming County, NY, Index No. 43260/10 | Testimony on behalf of family who allege that the subject wind utility causes sleep interference and other adverse effects from operation of wind turbines located approximately 1500 feet from home. |
| MOE Public Hearing for St. Columban Wind Project, | Critical review of Noise Impact Assessment conducted by Zephyr North for St. Columban Wind. | Ontario EBR Registry Number 011-7629, Ministry Reference Number: 6602-8V9P97 | Written testimony on behalf of residents living in or near the foot print of the St. Columban project, Huron County, Ontario, Canada |
| Wisconsin, Public Service Commission, Hearing on Application of Highland Wind Farm, Towns of Forest and Cylon, Wisconsin. | Supplemental Direct Testimony and additional statements to WPSC. Oral testimony pending on January 17, 2013. | WPSC Docket No. 2353-CE-100 | Testimony on behalf of Forest Voice on advanced analysis methods and findings from use of those methods to analyze the calibrated audio files collected by the PSC selected Team at homes of affected families in Shirley Wind Project, Glenmore, Wisconsin. |
| Michigan 28th Circuit Court: Wiltzer vs. Heritage Sustainable Energy, LLC | July 7, 2013 through April 3, 2014 | Case No. 12 8205 CZ | Deposition by Heritage July 7, 2013<br>Daubert Hearing: Oct. 24, 2013 and Dec. 5, 2013<br>2nd Deposition: April 3, 2014 |

**Summary of Court and Administrative Agency Cases**
**for Richard R. James, INCE Since 2006**
**Dec. 1, 2015[1]**

| Jurisdiction | Date | Case No. | Topic |
|---|---|---|---|
| Paulus vs. Citicorp, Bank data processing center backup diesel generator noise | Deposition: Dec. 18, 2013 Declarations and assistance with motions | Case No. 2:12-cv-856 | Deposition by Citibank on Dec. 18, 2013 Judge's response to motions for summary judgment and Daubert Hearing on James' qualifications for noise related to combustion engine noise and human response. |
| Dixon et. al v. Director, MOE and Middlesex- Lambton Wind Action Group Inc. et. al. v. Director, MOE | Sept. 26, 2013 | Case Nos. 13-084-13- 087 and Case. Nos. 13- 088-13-089 | Hearing on Application under Ontario Renewable Energy Act for St. Columban Wind project approval. |
| Cooper vs. Comer, Onandaga Race Track, Leslie, MI | Noise Study: Oct. 12, 2013 Hearing: Mar. 17, 2014, June 22, and Aug. 24, 2015 | File No: 13-1193-ND | Noise study of drag strip events and hearing with audio visual demonstration of noise at three test sites. |
| Drennan v. Director, Ministry of the Environment | Oct. 21, 2013 | Case Nos. 13-097/13- 098 | Hearing on Application under Ontario Renewable Energy Act for Kings Bridge 2 Wind Project approval. |
| Michigan, 28th Circuit Court for County of Missaugee. Wiltzer vs. Heritage Sustainable Energy. Daubert Hearing | Oct. 24, 2013 and Dec. 5, 2013 | Case No. 12 8205 CZ | Deposition: July 22, 2013 Daubert Hearing: Dec. 5, 2013 2nd Deposition: April 3, 2014 |
| Alberta, CA, Alberta Utility Commission, Bull Creek Wind | Nov. 18, 2013-Dec. | Proceeding ID No. 1955 | Testimony on behalf of Killarney Lake Group regarding deficiencies in Application for Bull Creek Wind and other reasons the application should be rejected. |
| Koeplin v. Director, Ministry of the Environment (ARMOW) | January 8, 2014 | Case: 13-124/13-125 | Hearing on Application under Ontario Renewable Energy Act for ARMOW Wind Project approval. |
| Rueter v. Osceola Windpower, LLC Iowa District Court/Osceola County | Deposition: original date of Aug. 21, 2014 postponed at defendant's request. To be rescheduled | EQCV0018304 | Noise Nuisance lawsuit against wind energy utility |
| Cham Shan Temple v. Director, Ontario Ministry of Environment (MOE) | Dec. 19, 2014 via Skype | ERT File: 13-140/13-141/13-142. | Hearing on impact of Sumac project wind turbines on Buddhist pilgrimage meditation practices. |
| Dingeldein v. Director, Ontario Ministry of Environment and Climate Change (MOECC) | May 6, 2015 at Grey Highlands Zero Power ERT | ERT File:15-011 | Hearing on impact of Grey Highland Zero Power Project. |
| Fohr v. Director, Ontario Ministry of Environment and Climate Change (MOECC) | | ERT File: 15-026 | Hearing on Impact of Grey Highland Clean Energy Project. Oral testimony not given due to problems with teleconference equipment. |
| Daniel Brian Williams v. Invenergy LLC, et al. | Trial date not set. | Case No. 2:13-cv-01391- AC US District Court, District of Oregon | Written Testimony and Deposition. |
| Intervenors v. Walnut Ridge Wind LLC (BHE Renewables) | July 23, 2105 and August 12, 2105 | BCZBA-WRW Bureau County, IL, USA | Oral and written testimony before Bureau County Zoning Board of Appeals regarding Walnut Ridge Wind Project. |
| Alliance to Protect Prince Edward County (APPEC) et al v. Director, MOECC | Nov. 19, 2015 | ERT Case Nos. 15-068/15-069 | Oral and written testimony before Ontario Environmental Review Tribunal regarding appeal of permit |
| Walker et al v. Kingfisher Wind, LLC,et al | TBD | Case No. 14-cv-914-D | US District Court, Western District of Oklahoma |
| Falmouth v Falmouth (Anderson) and (Ohkagawa) | TBD | Docket no. BACV2013-00281-A | Suit filed against Falmouth, MA regarding actions or inactions of Zoning Board of Appeals |

[1] This list is not intended as a definitive list of all work. It lists the primary cases where testimony was provided. It may also have incomplete or inaccurate information as a result of rescheduling or other changes.

**E-Coustic Solutions**

**Noise Control • Sound Measurement • Consultation**
**Community • Industrial • Residential • Office • Classroom • HIPPA Oral Privacy**
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**Richard R. James**
**Principal**
**Tel: 517-507-5067**

List of Recent Publications

Sept. 28, 2015

2008 Paper on "Simple guidelines for siting wind turbines to prevent health risks" for INCE Noise-Con 2008, co-authored with George Kamperman, Kamperman Associates.

2008 Expanded manuscript supporting Noise-Con 2008 paper titled: "The "How To" Guide To Siting Wind Turbines To Prevent Health Risks From Sound"

2009 "Guidelines for Selecting Wind Turbine Sites," Kamperman and James, Published in the September 2009 issue of Sound and Vibration.

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2011 Bray, W., HEAD Acoustics, James, R., "Dynamic measurements of wind turbine acoustic signals, employing sound quality engineering methods considering the time and frequency sensitivities of human perception," invited paper for Noise-Con 2011, Portland OR

2012 James, R., "Wind Turbine Infra and Low Frequency Sound: Warning Signs that were not Heard," April 2012, Bulletin of Science, Technology and Society, http://bsts.sagepub.com, DOI:10.1177/0270467611421845

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**Commission of Ohio Docketing Information System on**

**8/17/2016 5:19:52 PM**

**in**

**Case No(s). 16-1109-GE-BRO**

Summary: Comments of Richard James on behalf of Union Neighbors United et al. electronically filed by Mr. Christopher A Walker on behalf of Union Neighbors United and McConnell, Robert Mr. and McConnell, Diane Mrs. and Johnson, Julia F. Ms.

**This foregoing document was electronically filed with the Public Utilities**

**Commission of Ohio Docketing Information System on**

**11/8/2016 3:39:20 PM**

**in**

**Case No(s). 16-1109-GE-BRO**

Summary: Comments (Reply) electronically filed by Mr. Christopher A Walker on behalf of Union Neighbors United and Johnson, Julia F.  Ms. and McConnell, Robert Mr. and McConnell, Diane Mrs.