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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) 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 2000^{tm} 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 Daubert Hearing: Oct. 24, 2013 and Dec. 5, 2013 2nd Deposition: April 3, 2014

Summary of Court and Administrative Agency Cases
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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
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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"

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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