

Form RFIF (2/12/13)

REQUEST FOR INTERVENOR FUNDS

TO THE SECRETARY:

I hereby provide a request for intervenor funds in the following Article 10 case before the NYS Board on Electric Generation Siting and the Environment:

Case Number:

Re: Case 12-F-0410

Title of Case:

Cape Vincent Wind Power, LLC

Name of Party:

Town of Cape Vincent
Wind Power Ethics Group LLC

Contact Person:

Urban Hirschey - Town Supervisor
Clif Schneider - Town Councilman
Sarah Boss - Chairperson - Wind Power Ethics Group LLC

Firm Name:

Contact Address:

Town of Cape Vincent, 1964 NYS Rte 12E, Cape Vincent, NY 13618
Wind Power Ethics Group LLC, PO Box 435, Cape Vincent, NY 13618

Contact Telephone Number:

315-654-3795
315-654-2084

Contact E-mail Address:

Uhirschey@townofcapevincent.org
clif.schneider@gmail.com
dodgebay@twcny.rr.com

Amount of Funds Requested:

\$21,350

The basis of eligibility for intervenor funds is as follows: (mark one)

- Eligible Municipal Party**[County, city, town or village located in New York State that may be affected by the proposed major electric generating facility]
- Eligible Individual Local Party**[Person residing in a community who may be individually affected by the proposed major electric generating facility]
- Eligible Group Local Party**[Persons residing in a community who may be

collectively affected by the proposed major electric generating facility

1(a) Provide a statement of the number of persons the requesting party represents:

Represents the Town of Cape Vincent

1(b) Provide a statement of the nature of the interests the requesting party represents:

The Town has an interest in any action that may usurp its laws and plans.

2(a) Provide a statement of the efforts that have been made to obtain funds from other sources:

Other than taxpayer funds, BP's intervenor funding is the only other source of funds.

2(b) Provide a statement of the availability of funds from the resources of the requesting party:

The Town does not have all of the funds needed to fully represent all its interests.

2(c) Provide a statement of the availability of funds from the resources of sources other than the requesting party:

Only other source of funds are intervenor funds.

3(a) Indicate the type of funds being sought: (underline one) Pre-App funds or App funds

Pre-application funding.

3(b) State the amount of funds being sought:

\$21,350

4(a) If expert witnesses, consultants, attorneys, or others are to be employed, provide to the extent possible, the name and qualifications of each person to be employed:

Dr. Paul Schomer, Schomer and Associates

Resume - see attached

4(b) If expert witnesses, consultants, attorneys, or others are to be employed and it is not possible to provide the name of each person to be employed, provide for each person that cannot be named a statement of the necessary professional qualifications for the person:

na

5 Provide, if known, the name of any other interested person or entity who may, or is intending to, employ any such expert witnesses, consultants, attorneys, or others:

na

6(a) For all expert witnesses, consultants, attorneys, or others to be employed, provide a detailed statement of the services to be provided:

Dr. Schomer's basic charge is to: 1) review and critique the BP's Preliminary Scoping Statement (PSS) for the Cape Vincent Project; 2) develop a detailed list of noise issues to address along with a recommended approach and methodology for BP to follow in its studies of adverse noise impacts, 3) review Section 6.7 Noise in Town zoning law and comment on the law's efficacy and

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4) attend the stipulation phase of the Article 10 process to defend the Town's law and recommendations.

The Town is also requesting Dr. Schomer review the critiques of BP's PSS provided by the Town of Cape Vincent and the New York State Department of Public Service. Highlights of the Town and DPS recommendations pertaining to adverse noise impacts in its reviews are:

1. Town of Cape Vincent review of PSS:

1. The Town will demand that its laws that protect residents from noise, lights, and flicker impacts will remain in place and not be waived by the Article 10 Siting Board. [p.30]
2. Therefore, any assessment of noise impacts shall “operate in compliance” with the Town’s local law until such time as that law has been waived by the Siting Board, and since no waiver has been requested or granted, any noise predictions shall comply with the 35 dBA limit, which is the Town’s current nighttime restriction. [p.31]
3. Town requests a comparative assessment of several single wind turbines using the Town’s assumptions vs. a universal ground absorption coefficient. [p.31]
4. The Town requests C-Weighted impacts be included in predictive noise impacts, since BP erred and it is not required in the rules. [p.31]
5. The Town believes that comprehensive modeling of sound generated by industrial wind turbines should provide predicted levels at property lines as well as residences for all Township properties.
6. BP needs to update their Project map to include all the buildings and residences that have been added in the last 60 years, which is the time base for BP’s current map.
7. The Town recommends that as the discussion of the adverse impact of sound goes forward, that BP refrain from the human suggestibility argument. [p.32]
8. Regarding the design goal, and regardless of BP's biased view on infrasound, the Town requests that in addition to the normal noise impact predictions based on existing Town law, e.g., 35 dBA, that another scenario be included for the record based on 33.5 dBA to provide an interim measure of protection from infrasound until such time as further study resolves the issue to everyone's satisfaction. [p.33]

2. Department of Public Service review of PSS:

1. Noise and infrasound, shadow flicker, shadows, land value impacts should be considered as potentially having impacts on existing or potential future land uses. (DPS p.8)
2. Noise studies should be conducted pursuant to Town of Cape Vincent Zoning Law Section 6.7 and any noise mitigation plans must be submitted along with the application. [DPS p.16]
3. The PSS in section 2.15 does not specifically address any intent to study or otherwise address several items listed in the regulations at 16 NYCRR 1001.15(e) including audible frequency noise, low-frequency noise, and shadow flicker. Staff advises that

the applicant should propose a scope of studies to demonstrate a responsible approach to analyzing potential health impacts of low-frequency sound and vibration, including a thorough literature review, analysis of background conditions, report on the current known state of scientific analysis ongoing at the time of application, and provide an analysis of potential project effects in the project study area. Original study analyzing reported problems of low-frequency or infrasound and relation of problem locations to operating wind energy projects is recommended, including reporting on potential health effects. [p.28-30]

4. The scope of studies should provide details including the criteria to be used for selection of background and ambient noise level measurement locations and identification of proposed sampling or measurement locations.[p.28-30]
5. Tonal noise analysis mentioned at 2.19.1 (pg. 68) and 2.19.3 (at 5thbullet) should be performed for the proposed substation as well as for wind turbines. High voltage transformers are likely to exhibit tonal characteristics during operations. The scope should identify the analysis methodology, definitions and terminology, and applicable standards for performing the tonal characteristics analysis. [p.28-30]
6. Noise analysis of wind turbines should be based on turbine model(s) selected for installation at the project. The PSS statements about turbine models being selected at some future time is problematic for modeling noise emissions, predicting tonal character, and making findings regarding probable environmental impacts. Staff recommends that CVWP provide additional information regarding its proposal for studying turbine and project impacts of unspecified turbine make or model and provide more complete characterization of the classes of turbines under consideration, the range of turbine make(s) and model(s) within those classes, and representative data to demonstrate that it's proposal is responsible and will result in credible record information. Staff recommends that follow-up discussions be planned to address this and related topics with interested parties in attendance before the applicant advances to final scoping or application phases.[p.28-30]
7. The scope of Noise and Vibration studies should be revised to include:(a) a glossary of terminology and abbreviations used, so there is no misunderstanding by reviewing agencies or parties;and,(b) copies of any reference standards that will be relied upon in study methodologies. [p.28-30]
8. The position stated in section 2.19.3 at the second bullet that, “there are no plans at this time to carry out a survey of background sound levels during summertime conditions” as per the regulations at 16 NYCRR 1001.19(b), (f)(2) and (f)(5), will require that the applicant request a waiver from the application requirements. [p.28-30]
9. The PSS should be supplemented with a description of the scope and methodology that will be used to develop and perform the “evaluation of construction sound levels at potentially impacted and representative noise receptors” (Section 2.19.3, at third bullet). Describe how representative noise receptors will be selected and indicate specific representative receptors that may have already been selected or studied to

support the application. This selection of representative noise receptor locations should include consideration of interested parties. [p.28-30]

10. The PSS does not specifically address any intent to study or otherwise address low-frequency noise or vibration. Staff advises that the applicant should propose a scope of studies to demonstrate a responsible approach to analyzing potential health impacts of low-frequency sound and vibration, including a thorough literature review, analysis of background conditions, report on the current known state of scientific analysis ongoing at the time of application, and provide an analysis of potential project effects in the project study area. Original study analyzing reported problems of low-frequency or infrasound and relation of problem locations to operating wind energy projects is recommended, including reporting on potential health effects. [p.28-30]

Finally, BP included in its PSS this response to the Town's reference to the Wisconsin infrasound study, *"The actual finding of the Wisconsin PSC study was that the levels of infrasound from the project turbines were extremely low and most likely similar to or equivalent to the natural environmental sound level at those frequencies inside of each tested residence. In short, nothing was found that even suggested an explanation for the complaints about adverse health effects. The 33.5 dBA design goal was suggested by one of the team's investigators as an extreme precaution but others recommended 45 dBA as an adequate regulatory limit for the specific reason that the measured levels of infrasonic sound appeared to be utterly negligible."*

Dr. Schomer will also respond to BP's contention that infrasound impacts are "utterly negligible."

6(b) For all expert witnesses, consultants, attorneys, or others to be employed, provide a detailed basis for the fees requested, including hourly fee, wage rate, and expenses:

Hourly Rates	\$215
Prepare Review & Report (50 hrs)	\$10,750
Stipulation Conference (24 hrs)	\$5,160
Travel (2 contiguous days)	\$5,440
Total:	\$21,350

6(c) For all expert witnesses, consultants, attorneys, or others to be employed during the Pre-Application Stage, provide a detailed statement specifying how such services and expenses will make an effective contribution to review of the Preliminary Scoping Statement and the development of an adequate scope of appropriate studies for the application to be submitted and thereby provide early and effective public involvement:

Wind turbine noise impacts on people will be one of the most important issues related to siting a wind farm in any part of New York State. Most of the concerns about annoyance, sleep problems and other health effects are all directly related to excessive wind turbine noise on surrounding property, residences and people. It is important that this issue gets a comprehensive review by Department of Public Service and the Siting Board. To do that requires a complete and

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comprehensive scoping of the noise issue itself. In spite of the relatively detailed rules related to noise in Exhibit 19, the comments from the Town and Department of Public Service suggest a number of ways to expand and improve the study design for the turbine noise issue.

Dr. Schomer's experience and credentials make him an ideal choice for reviewing BP's PSS and also for considering the comments from the Town and DPS. His recent study with the infrasound issue puts him at the forefront of the emerging science on very low frequency sound impacts on people, and currently this issue is the most immediate concern of most regulatory authorities. The report and recommendations that will follow from this funding request will ultimately yield a better more complete record on one of the most important siting issues related to industrial wind development.

6(d) For all expert witnesses, consultants, attorneys, or others to be employed during the Application Stage, provide a detailed statement specifying how such services and expenses will contribute to the compilation of a complete record as to the appropriateness of the site and facility and will facilitate broad participation in the proceeding.

na

7(a) For any study to be performed, a description of the purpose of the study:

na

7(b) For any study to be performed, a description of the methodology and a statement of the rationale supporting the methodology:

na

7(c) For any study to be performed pursuant to any proposed methodology that is new or original, explaining why pre-existing methodologies are insufficient or inappropriate:

na

7(d) For any study to be performed, provide a description of the timing for completion of the study and a statement of the rationale supporting the timing proposed:

na

8(a) For any study to be performed, a statement as to the result of any effort made to encourage the applicant to perform the proposed studies or evaluations and the reason it is believed that an independent study is necessary:

na

9 For all expert witnesses, consultants, attorneys, or others to be employed, provide a copy of any contract or agreement or proposed contract or agreement with each such expert witness, consultant, attorney, or other person.

10 Provide a statement of any additional justification for the funding request not already addressed above:

SCHOMER AND ASSOCIATES, INC.

Consultants in Acoustics and Noise Control

Paul D. Schomer, Ph.D., P.E.
Member; Board Certified
Institute of Noise Control Engineering

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CHAMPAIGN, ILLINOIS 61821
PHONE: (217) 359-6602
FAX: (217) 359-3303

PAUL D. SCHOMER Acoustical Engineer

BS, Electrical Engineering, University of Illinois, 1965.
MS, Electrical Engineering-Acoustics, University of California, Berkeley, 1966.
Ph.D., Electrical Engineering-Acoustics, University of Illinois, 1971.

EXPERIENCE

Dr. Schomer has extensive experience, publications, and patents in the areas of environmental noise and its assessment, human and community response to noise, instrumentation and methodology for the measurement and monitoring of noise, sound propagation, and acoustical measurements of building parameters. He is a consultant to industry and government and a research leader in acoustics. His recognition by his peers as an international leader in the area of environmental noise is demonstrated by his chapters in reference books, his more than 45 refereed publications, his leadership in Standards organizations and professional societies, and his awards and honors. Dr. Schomer is also standards Director for the Acoustical Society of America.

As an international leader in the area of environmental noise, Dr. Schomer is chairperson of the United States delegation to International Organization for Standardization (ISO) Acoustics and Noise committees, past chairperson of the American National Standards Institute (ANSI) Committee dealing with noise, chairperson of the ISO working groups which deal with environmental noise and with impulsive noise measurement, chairperson of the ANSI/ASA working group which deals with environmental noise, and he is the United States representative to the International Organization for Standardization in the areas of aircraft noise and impulsive sources. He is the Standards Director for the Acoustical Society of America, a past member of the Society of Automotive Engineers Aircraft Noise Committee, a principle contributor to current efforts in the area of standardizing airport noise monitoring, and former Executive Director, past vice-president for membership, and twice a past member of the board of the Institute of Noise Control Engineering. He is also a past adjunct Professor of Electrical and Computer Engineering (Acoustics) and member of the graduate faculty of the University of Illinois

Dr. Schomer has 45 years of experience dealing with noise measurement and the effects of noise on people and communities. This experience includes airport, aircraft, helicopter, construction and traffic noise, general industrial and urban noise, wind turbine noise, blast and mining noise, small arms gunfire noise. The citation for his selection as a Fellow of the Acoustical Society of America references his studies on community response to noise, and most of his work with the National Academy of Science has been concerned with noise assessment.

MEMBER FIRM, NATIONAL COUNCIL OF ACOUSTICAL CONSULTANTS

MEMBERSHIPS AND AWARDS

Fellow - Acoustical Society of America.

Member, Board Certified, Institute of Noise Control Engineering

Selected as Corps of Engineers Engineer of the Year and One of the Top 10 Federal Engineers of the Year (1990)—National Society of Professional Engineers

Several times a member of the board and/or officer; Institute of Noise Control Engineering.

Former Executive Director, Institute of Noise Control Engineering of the USA, Inc.

Standards Director, Acoustical Society of America

Chairman, Acoustical Society of America Committee on Standards

Head of U.S. Delegation, International Organization for Standardization, Technical Committee 43 (acoustics) and Subcommittee 1 (noise).

Convener (chairman), International Organization for Standardization, Working Group 45 dealing with environmental noise assessment.

Chairman, S.A.E. Construction Site Sound Level Subcommittee, S.A.E. ConAg Committee.

Past Member, S.A.E. Aircraft Noise Committee and the noise monitoring subcommittee.

Reviewer for *Applied Mechanics Review*, *Journal of the Acoustical Society of America*, and *Noise Control Engineering Journal*.

Fellowship, University of Illinois (1968-1971).

Registered Professional Engineer (DC).

Member, Institute of Noise Control Engineering, Acoustical Society of America, Institute of Electrical and Electronic Engineers, German Acoustical Society (DEGA), European Acoustical Association

BOOKS

Handbook of Acoustical Measurements and Noise Control, Chapter 50. Community Noise Measurements, 2nd edition, John Wiley and Sons, Inc., New York, 1991.

Reference Data for Radio Engineers, Chapter 40. Electroacoustics, 7th edition, ITT Press, a subsidiary of MacMillan, Inc., Indianapolis, 1985.

Reference Data for Radio Engineers, Chapter 40. Electroacoustics, 8th edition, Sams Publishing, Prentice-Hall Computer Publishing, Indianapolis, 1993.

MAJOR JOURNAL PUBLICATIONS

"Criteria for wind-turbine noise immissions," Accepted for 21st International Congress on Acoustics (ICA), 165th Meeting of the Acoustical Society of America (ASA), and 52nd Meeting of the Canadian Acoustical Association, Montreal, Canada, 2-7 June 2013.

"Can wind turbine sound that is below the threshold of hearing be heard?" Accepted for 21st International Congress on Acoustics (ICA), 165th Meeting of the Acoustical Society of America (ASA), and 52nd Meeting of the Canadian Acoustical Association, Montreal, Canada, 2-7 June 2013.

"Role of a community tolerance value in predictions of the prevalence of annoyance due to road and rail noise," *Journal of the Acoustical Society of America*, **131**(4), 2773-2786, April 2012.

"A first-principles model for estimating the prevalence of annoyance with aircraft noise exposure," *Journal of the Acoustical Society of America*, **130**(2), 791-806, August 2011.

"A re-analysis of Day-Night Sound Level (DNL) as a function of population density in the United States," *Noise Control Engineering Journal*, **59**(3), 1xx-1xx, (May/June 2011).

"Limitations of current dosage-response relationships for predicting the prevalence of annoyance due to transportation noise," INTERNOISE 2011, Osaka Japan, 4-7 September 2011.

"Wind-induced pseudo-noise and leaf-rustle noise," *Noise Control Engineering Journal*, **58**(2), 121-131, (March/April 2010).

"Explanation of and conclusions drawn from American National Standard Methods for estimation of awakenings associated with outdoor noise events heard in homes," INTERNOISE 2010, paper 1126, Lisbon Portugal, 13-16 June 2010.

"Proposed Ai-Weighting; a weighting to remove insect noise from A-weighted field measurements." INTERNOISE 2010, paper 594, Lisbon Portugal, 13-16 June 2010.

"On Efforts to Standardize a Graphical Description of the Soundscape Concept," INTERNOISE 2010, paper 593, Lisbon Portugal, 13-16 June 2010.

"Wind-induced pseudo-noise and leaf-rattle noise," INTERNOISE 2009, Paper IN09_584, Ottawa, Canada, 23-26 August 2009.

"The difference between Day-Night Average Sound Level and the European Union Day-Evening-Night Average Sound Level for a typical sample of 100 housing sites," INTERNOISE 2009, Paper IN09_583, Ottawa, Canada, 23-26 August 2009.

"Visitor perception of park soundscapes: A research plan," *Noise/News International*, **17**(2), 51-56, (June 2009).

"Uncertainties in measuring aircraft noise and predicting community response to it," *Noise Control Engineering Journal*, **55**(1), 82-88, (January/February 2007).

“When there are audible rattle sounds, annoyance may depend only on the worst case— independent of number of events,” INTERNOISE 2006, Paper N190, Honolulu, HA, USA, 3-6 December 2006.

“A-weighting sometimes works for assessing environmental noise—sort of; it should be retired,” INTERNOISE 2006, Paper N202, Honolulu, HA, USA, 3-6 December 2006.

“A statistical description of sound propagation: A comparison of elevated and near-ground sources,” *Noise Control Engineering Journal*, **54**(3), 25-36, (May-Jun 2006).

“Biases introduced by the fitting of functions to attitudinal survey data,” NOISE-CON 2005, *Institute of Noise Control Engineering*, Minneapolis, MN, USA, 17-19 October 2005.

“Criteria for assessment of noise annoyance,” *Noise Control Engineering Journal*, **53**(4), 132-144, (July/August 2005).

“Overview of the theoretical development and experimental validation of blast sound absorbers,” *Noise Control Engineering Journal*, **53**(3), 70-80, (May/June 2005).

“Basic results from full-scale tests at Ft. Drum,” *Noise Control Engineering Journal*, **53**(3), 94-109, (May/June 2005).

“Some Important Factors in Community Response to Sonic Booms,” NOISECON 2004, *Institute of Noise Control Engineering*, Baltimore, MD, USA, 12-14 July 2004.

“The importance of proper integration of and emphasis on the low-frequency sound energies for environmental noise assessment,” *Noise Control Engineering Journal*, **52**(1), 26-39, (January/February 2004).

“Noise Assessments: Interaction with the Public—Simplicity and Truth Will Help,” INTERNOISE 2003, Paper N706, pp 1216-1220, Seogwipo, Korea, 25-28 August 2003.

“Does the Soundscape Concept Have Real Utility,” INTERNOISE 2003, Paper N161, pp 2825-2826, Seogwipo, Korea, 25-28 August 2003.

“Noise Assessment Metrics and Criteria in a United States Department of Transportation Multi-Modal Noise Model,” NOISECON 2003, Paper No. 023, *Institute of Noise Control Engineering*, Cleveland, OH, USA, 23-25 June 2003.

“A statistical description of ground-to-ground sound propagation,” *Noise Control Engineering Journal*, **51**(2), 69-80, (March/April 2003).

“On Normalizing DNL to Provide Better Correlation with Response,” *Sound & Vibration*, pp 14-23, December 2002.

“Further Results Using Loudness-Level Weighting to Assess Noise Annoyance,” INTERNOISE 2002, Paper No. N489, *Institute of Noise Control Engineering International*, Dearborn, MI, USA, 19-21 August 2002.

“Alternative Methods to A-Weighting for Environmental Noise Assessment,” NTERNOISE 2002, Paper No. N475, *Institute of Noise Control Engineering International*, Dearborn, MI, USA, 19-21 August 2002.

“Evaluation of loudness-level weightings for assessing the annoyance of environmental noise,” *Journal of the Acoustical Society of America*, **110**(5) Pt. 1, 2390-2397, (November 2001).

“Criteria for the Assessment of Noise Annoyance,” NOISECON 2001, Paper No. NC01_018, *Institute of Noise Control Engineering USA*, Portland, Maine, 29-31 October 2001.

“Use of the New ISO 226 Equal Loudness Contours as a Filter to Assess Noise Annoyance,” NTERNOISE 2001, Paper No. 197, *Institute of Noise Control Engineering International*, The Hague, Holland, 27-30 August 2001.

“A statistical description of blast sound propagation,” *Noise Control Engineering Journal*, **49**(2), 79-87, (March/April 2001).

“Using fuzzy logic to validate blast noise monitor data,” *Noise Control Engineering Journal*, **48**(6), 193-205, (November/December 2000).

“A comparison between the use of loudness level weighting and loudness measures to assess environmental noise from combined sources,” INTERNOISE 2000, Paper No. 101, *Institute of Noise Control Engineering International*, Nice, France, 27-30 August 2000.

“A test of proposed revisions to room noise criteria curves,” *Noise Control Engineering Journal*, **48**(4), 124-129, (July/August 2000).

“Proposed revisions to room noise criteria,” *Noise Control Engineering Journal*, **48**(3), 85-96, (May/June 2000).

“Loudness-Level Weighting for Environmental Noise Assessment,” *Acustica and Acta Acustica*, **86**(1), 49-61 (January/February 2000).

“Revision to the ISO 1996 series--Description, measurement and assessment of environmental sound,” INTERNOISE 98, Paper No. 190, *Institute of Noise Control Engineering International*, Christchurch, New Zealand, November 1998.

“On spectral weightings to assess human response, indoors, to blast noise and sonic booms,” *Noise Control Engineering Journal*, **46**(2), 57-71, (March/April 1998).

“Evaluation of a re-analysis of the relationship between the results obtained in laboratory and field studies on the annoyance caused by high-energy impulsive sounds,” *Noise Control Engineering Journal*, **45**(6), 251-255 (November/December 1997).

“A comparative study of human response, indoors, to blast noise and sonic booms,” *Noise Control Engineering Journal*, **45**(4), 169-182 (July/August 1997).

“The new ANSI method for assessing combined noise environments; comparison with other methods,” INTERNOISE 97, 1047-1052, *Institute of Noise Control Engineering International*, Budapest, Hungary, August 1997.

“On the contribution of noticeability of environmental sounds to noise annoyance,” *Noise Control Engineering Journal*, **44**(6), 294--305 (November/December 1996).

“Penalties for assessing helicopter noise annoyance—There is none?” NOISE-CON 96, 581-584, *Institute of Noise Control Engineering*, Seattle, WA, September 1996.

“A Comparative Study of Human Response to Blast Noise and Sonic Booms,” INTERNOISE 96, *Institute of Noise Control Engineering International*, Liverpool, UK, July 1996.

“Development of a New ANSI Standard for Assessment of Combined Noise Environments,” INTERNOISE 96, 3265-3270, *Institute of Noise Control Engineering International*, Liverpool, UK, July 1996.

“25 Years of progress in noise standardization,” *Noise Control Engineering Journal*, **44**(3), 141-148 (May/June 1996).

“Human and community response to military sounds: Results from field-laboratory tests of small arms, 25 mm cannon, helicopter and blast sounds,” *Noise Control Engineering Journal*, **43**(1), 1-13 (January/February 1995).

“Amendments to ISO Part 2: The Impulse Noise Penalty,” INTERNOISE 95, *Institute of Noise Control Engineering International*, 851-856, Newport Beach, CA, USA, 1995.

“New descriptor for high-energy impulsive sounds,” *Noise Control Engineering Journal*, **42**(5), 179-191 (September/October 1994).

“SoundProp: Fast, accurate prediction of sound propagation under varying weather conditions and over hard or soft surfaces,” INTERNOISE 94, 555-558, *Institute of Noise Control Engineering International*, Yokohama Japan, August 1994.

“A revised statistical analysis of blast sound propagation,” *Noise Control Engineering Journal*, **42**(3), 95-100 (May/June 1994).

“Human and community response to military sounds: Results from field-laboratory tests of small arms, tracked vehicles, and blast sounds,” *Noise Control Engineering Journal*, **42**(2), 71-84 (March/April 1994).

“Activity and sleep interference; A new measurement technique,” INTERNOISE 93, *Institute of Noise Control Engineering International*, Leuven, Belgium, July 1993.

“Time-average aircraft noise descriptors; Confusion with no benefit,” INTERNOISE 92, **2**, 987-992, *Institute of Noise Control Engineering International*, Toronto, Canada, July 1992.

“On Using the Generalized Concept of Loudness to Predict Annoyance,” INTERNOISE 91, *Institute of Noise Control Engineering International*, Australia, December 1991.

“Decibel annoyance reduction of low-frequency blast attenuating windows,” *Journal of the Acoustical Society of America*, **89**(4), April 1991.

“Descriptors for Community Noise Assessment; logical Extensions to DNL,” NOISECON 90, *Institute of Noise Control Engineering*, Austin TX, October 15-17 1990.

“Reduction of Wind Noise for Unattended Blast Noise Monitoring,” *Noise Control Engineering Journal*, **34**(2), March/April 1990.

“Indoor human response to blast sounds that generate rattles,” *Journal of the Acoustical Society of America*, **86**(2), August 1989.

“On a theoretical interpretation of the prevalence rate of noise-induced annoyance in residential populations: High-amplitude impulse noise environments,” *Journal of the Acoustical Society of America*, **86**(2), April 1989.

“The role of Helicopter noise-induced vibration and rattle in human response,” *Journal of the Acoustical Society of America*, **81**(4), April 1987.

“High-energy impulsive noise assessment,” *Journal of the Acoustical Society of America*, **79**(1), January 1986.

“Assessment of community response to impulsive noise,” *Journal of the Acoustical Society of America*, **77**(2), February 1985.

“Descriptor for rotary-wing aircraft noise,” American Institute of Aeronautics and Astronautics, October 1984.

“A survey of community attitudes towards noise near a general aviation airport,” *Journal of the Acoustical Society of America*, **74**(6), December 1983.

“Noise monitoring in the vicinity of a general aviation airport,” *Journal of the Acoustical Society of America*, **74**(4), April 1983.

“Sampling strategies for monitoring noise in the vicinity of airports,” *Journal of the Acoustical Society of America*, **73**(6), June 1983.

“An analysis of community complaints to noise,” *Journal of the Acoustical Society of America*, **73**(4), April 1983.

“Time of day noise adjustments or ‘penalties’,” *Journal of the Acoustical Society of America*, **73**(2), February 1983.

“A model to describe community response to impulse noise,” *Noise Control Engineering Journal*, **18**(1), January/February 1982.

“The growth of community annoyance with loudness and frequency of occurrence of events,” *Noise Control Engineering Journal*, **17**(1), July/August 1981.

“Temporal sampling requirements for estimation of long-term average sound levels in the vicinity of aircraft,” *Journal of the Acoustical Society of America*, **69**(3), March 1981.

“Development of temporal sampling strategies for monitoring noise,” *Journal of the Acoustical Society of America*, **66**(3), September 1979.

“High-amplitude/low-frequency impulse calibration of microphones; a new method,” *Journal of the Acoustical Society of America*, **65**(2), February 1979.

“Growth function for human response to large-amplitude impulse noise,” *Journal of the Acoustical Society of America*, **64**(6), December 1978.

“Human response to house vibrations caused by sonic booms or air blasts,” *Journal of the Acoustical Society of America*, **64**(1), July 1978.

“Statistics of amplitude and spectrum of blasts propagated in the atmosphere,” *Journal of the Acoustical Society of America*, **63**(5), May 1978.

“Evaluation of C-weighted L_{dn} for assessment of impulse noise,” *Journal of the Acoustical Society of America*, **62**(2), August 1977.

“Correlation techniques applied to acoustical measurements in reverberant rooms,” *Journal of the Acoustical Society of America*, **56**(5), 1974.

“Measurement and characterization of off-road construction vehicle noise,” *Noise Con73*, 247-249, 1974.

STATE OF ILLINOIS REPORTS

Proposed Revisions to Property-Line-Noise-Source Measurement Procedures, ENR Report No. REEA91/10, Illinois Department of Energy and Natural Resources, 1991.

Impulse Noise Study, ENR Report No. REEA90/16, Illinois Department of Energy and Natural Resources, November 1990.

A Demonstration of Airport Noise Impact Mitigation, ENR Report No. 83/25, Illinois Department of Energy and Natural Resources, June 1983.

The Economic Impact Study of Proposed Airport Noise Regulations, R774 Volume 1: Technical Study of Public Airports in Chicago, ENR Report No. 81/38, Illinois Department of Energy and Natural Resources, November 1981.

The Economic Impact Study of Proposed Airport Noise Regulations, R774 Volume 1: Technical Study of Public Airports Outside Chicago, ENR Report No. 81/02, Illinois Department of Energy and Natural Resources, January 1981.

Human and Community Response to Impulse Noise: A Literature Review, IIEQ Report No. 78/07, Illinois Institute for Environmental Quality, March 1978.

Motorcycle Noise Levels: A Report on Field Tests, Report of the Illinois Task Force on Noise, June 1975.

Control of Noise from Motor Vehicles Part III: Technical Study in Support of Proposed Motor Vehicle Noise Regulations, Report of the Illinois Task Force on Noise, June 1974.

Sound Transmission Loss Between Spaces Connected by Multiple Paths: A New Measurement Technique, Ph. D. Thesis, University of Illinois, August 1971.

PATENTS

Logarithmic Statistical Distribution Analyzer, Patent No. 3995500.

Microphone Droop and Sensitivity Measurement Device, Patent No. 4347410.

TYPICAL PROJECT EXPERIENCE

AIRPORT NOISE ASSESSMENT AND PART 150 STUDIES

Conducting the acoustical analysis and measurements contained within airport Part 150 studies including (1) the generation of present and future, predicted noise contours, (2) the execution of noise monitoring, the comparison of monitoring results with noise contours, and the analysis of monitoring results by aircraft type, operation, and runway, and (3) the development and analysis of noise mitigation strategies.

HELIPORT DESIGN AND ASSESSMENT

Assessment of the heliport noise. Establishing the need for mitigation. Assessing mitigation alternatives.

ENTERTAINMENT NOISE

Evaluated measurements for a large, outdoor music venue. Evaluated band and DJ noise from a club as it affected the neighborhood. Suggested mitigation methods. Evaluated measurement and monitoring plans for an outdoor music performance arena.

EXPERT WITNESS REGARDING NOISE PREDICTION AND ITS EFFECTS ON PEOPLE

Numerous cases, the following are examples:

For the defense: Class action suit of homeowners against ARCO Oil.

For the plaintiff: Class action suit of homeowners against Peabody Coal Company.

For both of these, performed analysis of the physical noise and its predicted levels in the community, and assessed the received noise and its effect on individuals and the community.

For the defense/plaintiff: Predicted, measured and analyzed noise from parked outdoor refrigerator trucks in a special situation.

For the plaintiff: Predicted and analyzed the effect of strip-mining explosions on a distant factory

structure.

For the plaintiff: Class action and community suits against airport noise including a \$128,000,000 settlement for the city of Minneapolis.

EXPERT WITNESS REGARDING THE AUDIBILITY AND NOTICEABILITY OF SIGNALS AND ALARMS

For the defense: Analyzed the audibility of gunshot sound.

For the defense: Analyzed the noticeability of off-road truck noise in a quarry delivery plant.

For the defense: Analyzed the audibility and noticeability of truck noise in the presence of other neighborhood noise.

For the plaintiff: Analyzed the audibility and noticeability of siren noise at cross intersection.

For the plaintiff: Analyzed the noticeability of sirens when there is more than one.

For the defense: Analyzed the audibility of breaking glass and its ability to set off a glass-break detector.

For the defense: Analyzed the ability of a fire alarm to wake up and warn a person.

For the plaintiff: Analyzed the ability of a fire alarm to warn someone.

For the defense: Analyzed the ability of a fireman's PASS device to be noticed at a fire scene.

GUN CLUBS/POLICE FIRING RANGES

Performed noise assessment and mitigation at several civilian and police small arms firing ranges including siting, layout, operations, and noise mitigating structures and fixtures.

INDUSTRIAL NOISE CONTROL--OUTDOORS

Performed noise assessment and mitigation at a variety of outdoor industrial operations such as an asphalt plant, a kitty-litter plant (similar drum to asphalt plant for drying clay), an ammunition disposal plant (again a heated drum), and grain elevators.

MOTOR RACEWAY NOISE

Performed assessment, evaluated existing and planned mitigation and developed alternatives. Evaluated management and operational plans and developed alternative strategies.

PARK SOUNDSCAPES

Review and develop research plans for the NPS to develop the basis for National and International Standards for assessing and measuring park soundscapes.

PRODUCT DEVELOPMENT

Design, testing and evaluation of outdoor warning sirens.

VEHICLE/HIGHWAY NOISE

Assessment of highway noise. Monitoring highway noise. Establishing the need for mitigation. Assessing mitigation alternatives.

WIND FARM NOISE ASSESSMENT

For the proponents, established noise criteria, propagation model, and assessment for 100 + wind farm, presented the acoustical results before a large, well-attended, public hearing.

For the proponents, measured the ambient for two, one-to-two turbine installations in Champaign County, Illinois.

For concerned parties, provided background noise measurements. (NY)

For concerned parties, developed a draft wind law noise ordinance. (NY)

For concerned parties, presented health and modeling issues to regulatory commission (WI)

Serve as the "mediating" expert for both sides in legal proceedings (OR)

ILLINOIS NOISE REGULATIONS

Examination of the adequacy of existing noise regulations contained in Subtitle H, 35 Illinois Administrative Code. Analysis of the existing rules and whether they appropriately encompass the various types of discontinuous noise and specifically, impulse noise. Recommendations for changes to sections of the Code dealing with definitions and regulatory levels.

REVISIONS TO ILLINOIS PROPERTY-LINE NOISE MEASUREMENT PROCEDURES

Examination of existing measurement procedures as related to American National Standards. Recommendation of measurement procedures for determination of octave-band 1-hour equivalent levels corrected for background ambient. (No American National or International Standards exist for this type of measurement, but these are the type required by the Illinois Pollution Control Board.)

HUMAN AND COMMUNITY RESPONSE TO NOISE

Conducting and supervising international research experiments designed to explain, qualify and quantify human and community response to noise of varying character, spectra and temporal patterns. This research concentrates on comparing and contrasting special noises such as small arms, rotary-wing aircraft, or large explosions to more common noise such as road vehicles or artificially generated noise. A key to this work is conducting these experiments in real houses with real sources of sound.

TEMPORAL SAMPLING STRATEGIES FOR MONITORING AIRPORT NOISE

Analysis of daily monitoring results from many of the nation's airports. Modeling of the results by auto-regressive moving average (ARMA) models, and analysis of the results by "Monte Carlo" methods. Recommendation of airport noise sampling strategies for obtaining the required degrees of precision.