

Robert W. Rand, ASA, INCE
RAND ACOUSTICS, LLC
65 Mere Point Road
Brunswick, ME 04011

E-mail: rrand@randacoustics.com
Telephone: 207-632-1215

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MEMO: Detailed Work Experience

To: THE PUBLIC UTILITIES COMMISSION OF THE STATE OF SOUTH DAKOTA

Re: Docket No. EL 18-053
APPLICATION BY DEUEL HARVEST WIND, LLC FOR A PERMIT OF A WIND ENERGY
FACILITY AND A 345-kV TRANSMISSION LINE IN DEUEL COUNTY, SOUTH DAKOTA
FOR THE DEUEL HARVEST NORTH WIND FARM

On request of Christina Kilby this memo provides details of work experience on a number of projects over the last almost-four decades that may assist the SD PUC in understanding the qualifications for professional review for noise control, noise impact assessment, and general expertise in acoustics.

Detailed Work Experience

Rand Acoustics

Principal Consultant in Acoustics –1996 to present

Projects included:

- AMEC Foster Wheeler, 2017-2018. Interior Acoustics Modeling and Noise Exposure Assessment. Acoustic calculations were performed using CadnaR by Datakustik, a 3D-grid acoustic modeling package considered state of the art for interior sound modeling. Models were developed for 26 equipment types and a total of 364 noise sources distributed throughout a multi-level defense facility. Noise level mapping, noise criteria and exposure assessments were delivered in phases for 95 and 100 percent design. Work performed under NDA.
- Independent investigator, industrial wind turbine community noise impact assessment, 2009-present. Determined that community reaction to wind turbine noise is predictable. Performed a number of peer reviews of site applications and evaluated operating industrial wind turbine sites. Provided expert testimony to towns in Maine and Massachusetts, to the State of Maine Board of Environmental Protection, to the Environmental Review Tribunal of Ontario, and to the Public Service Commission of Wisconsin. In 2011 Rand testified to the Maine Board of Environmental Protection who later reduced the nighttime noise limits for wind turbines. In 2012 Rand provided wind turbine noise assessments to the Prime Minister and Parliament of the nation of Aruba. In November 2013 Rand testified to the Ohio Senate regarding costs of noise control at wind turbine facilities. From 2009-2019 Rand has provided expert testimony in several states and conducted a number of independent noise and pressure pulsation surveys and invited presentations on industrial wind

turbine noise for towns in Maine and Michigan. Many of these communities adopted noise ordinances to protect the health and well being of their citizens.

- Citizens for Quiet Skies, Longmont, Colorado, 2015. Investigator, skydiving aircraft community noise impacts. Performed attended survey measurements, calculations of DNL, Lmax, Prominent Discrete Tones, and times-series Indoors Danish Lpa,lf to assess potential for nuisance, annoyance and speech interference. Expert testimony was provided at trial in Boulder County, Colorado.
- Designer, serial data logger SDL2 for infrasonic acoustic surveys, 2015-present. The SDL2 stores GPS time- and location-stamped ASCII human-readable files on SD flash card for data streamed from the Infiltec INFRA-20 16-bit, 50Hz fast microbarometer. The SDL2 solves operational issues encountered with Windows-based serial data-logging software, and is used by acoustic investigators for acquiring long-term file sets of microbarometer data.
- Engineering firm (confidential by NDA), 2012-2013. Consulting, control firmware development and field testing for a 50kw 3-phase wind turbine product.
- Private residence, Cape Elizabeth, Maine, 2011-2012. Custom audiophile listening room design. Performed room impulse response measurement, developed specifications for modified room shape, front wall design, and acoustic treatment including absorption and rear-wall diffusion. Achieved broad soundstage, accurate imaging.
- Wavepool, the Deep Relaxation Soundtrack. 2008-present. Wrote and produced the best-selling sixty-minute soundtrack for professional health and wellness therapists and people suffering from stress. Now in its third production run, the Wavepool soundtrack was strongly endorsed for deep relaxation and shamanic healing by Sandra Ingerman, author and board certified expert on traumatic stress. The Wavepool soundtrack is in use worldwide and at teaching and wellness centers including the Kripalu Center for Yoga and Health, the Deepak Chopra Center of Los Angeles, and licensed for Yoga Nidra by Jennifer Reis, a principal at Kripalu.
- Towns of Bath, Camden, Old Orchard Beach, and Portland, ME, 2005-2007. Acoustical evaluations and solutions and recommendations for annoyance and sleep disturbance, mixed-use zoning issues, and ordinance design.
- Cianbro/Public Service Company of New Hampshire, 2004. Portsmouth Unit 5 Wood Yard plant and community noise surveys and compliance assessments.
- Rumford Power, Rumford, ME, 2007. Speech intelligibility improvements. Control Room noise evaluation, criteria development, and new floor design to isolate noise from floor below and improve speech intelligibility.
- IT Group: Noise control consulting for the Somerset Power Plant, Somerset, MA, including detailed community and plant noise surveys, evaluations of coal ship unloading noise, noise impact assessment and criteria development, and coal yard noise barrier design.
- Multimedia Systems Design, Cambridge, MA, 2004-2005. Acoustical consulting for Dana Farber Hospital PET/CT Facility: Designed and implemented an improved patient communication in CT scanning facility; conducted noise and reverberation surveys, noise criteria and impact assessments, specified HVAC noise controls, and designed communications system with programmable noise-cancelling speech controllers which improved speech intelligibility between patients and clinicians. Also developed complex audio-visual system designs for large educational and corporate customers

including Harvard University, MIT, Siemens, and Kraft, providing high-intelligibility, broad soundstage and surround-sound acoustical room designs for public centers and corporate conference rooms.

- OSRAM Sylvania, Danvers, MA, 1996-2004. Audio-visual design consulting services for the Lightpoint Training Facility. Designed and maintained audio-visual controls and user interfaces.
- AEC Engineering Inc., Freeport, ME: Acoustical consulting for US ARMY STRICOM OSV Audio program. Acquired precision high sound pressure 25mm weapon noise signatures at Aberdeen Proving Ground, Maryland. Decoded digital electronic signaling from a Loral tank laser simulator at Fort Irwin, Barstow, CA. Developed a tank-connectable COTS high-sound-power audio device for high-volume weapons audio signal output to improve battlefield conditions fidelity for personnel training. Accepted by STRICOM testing in San Jose, CA.
- Advanced Recycling, Concord, NH: Design, installation, and administration of a four-channel environmental noise and vibration compliance monitoring system (ENVMS). Acquired and transmitted daily reports of 15-minute statistical sound and vibration levels over a period of five years.
- Bowdoin College Peary-McMillan Arctic Museum: Time-synchronized wire recordings to motion picture films while preserving pitch and character.

Technology Systems, Inc., Wiscasset, Maine
Project Manager –1993 to 1996

Projects included:

- Product designer of the VR-100, an electro-acoustic communications product, the first VOIP application device deployed to 13 countries connecting over secure global network. Designed the VR-100 to work out of the box; plug in power, network and control keypad with display, turn on and go. Ring-buffered audio supported bursty secure communications inside the worldwide U.S. defense network and greatly reduced taxpayer funded telephone charges during simulations.
- Product designer of EARS, an "enhanced audio reality system" for defense audio simulations, funded by SBIR contract. The EARS decoded Distributed Interactive Simulation (DIS) network packets, dead-reckoned object locations and trajectories, and translated those into four-dimensional audio using an HRTF Convolution Engine tuned by Rand, creating a real-time virtual audio environment. An electro-acoustic product providing networked virtual audio reality in 1995.

Stone & Webster Engineering Corporation, Boston, Massachusetts
Senior Environmental Consultant –1988 to 1993

Projects included:

- Hanscom Air Force Base: Developed acoustical design criteria and stringent noise control design for recording facility (STC 70 plus low frequency isolation) under strict cost controls. Facility performance tested and accepted by the Air Force.

- Successfully removed sleep disturbance and annoyance impacts from vibration and noise from a top-story 2-Megawatt diesel cogeneration plant under shutdown order in litigation in large residential building complex in Philadelphia. Design consulting included noise impact assessment and criteria development, selection, specification, and post-installation testing of pneumatic elastomeric mounts for 16-cylinder engine frame and separate make-up air compressors. Neighbors satisfied with noise and vibration reductions. Case settled out of court.
- Performed noise surveys and, on some projects, noise impact assessment, criteria development, and extensive environmental noise mitigation, for several power stations and transformer yards, gas compressor stations and a multi-turbine cogeneration power station. Performed noise studies and computer analyses of large induced draft fans, diesel engines, commuter rail, and a large composting facility.

Envision Corporation, Boston, Massachusetts
Principal Designer and Consultant, 1985 to 1988

Projects included:

- Bank of Boston, Boston, MA: Evaluated and improved poor interior acoustics for the bank's conference facility providing noise surveys with impact assessment, criteria, and design to retrofit inspections.
- GTE Sylvania: Designed interior acoustics and high-fidelity sound reinforcement system with feedback cancellation for speaker and media presentations with high speech intelligibility. Designed a comprehensive audio-visual media system with multiple touch-screen controls for the corporate training facility. The multi-screen touch control system design was a first of its kind and emulated in later commercial control designs.

Stone & Webster Engineering Corporation, Boston, Massachusetts
Principal Scientist, Noise & Vibration Group, 1980 to 1984

Projects included:

- New England Power Company: Noise Control Engineer, Conversion to Coal: Brayton Point Units 1, 2 and 3. Conducted specialized reactive silencer testing, presented test methods to the ASA.
- Montana Power: Noise Exposure Investigator, Billings and Colstrip Plants. Performed statistical noise dosimetry and measured noise levels plant-wide for noise mapping in plant work areas; assessed for noise impact and advised on noise mitigation strategies.
- ESEERCO, NY: Field Investigator, Statistical Noise Dosimetry Project. Field measurements and testing of statistical noise dosimetry with stratified sampling.
- *Corporate Silencer Specialist* for two years, responsible for contract noise and vibration specifications development, maintenance, and contract bid reviews on all SWEC projects.