

PROPOSED RULE AMENDMENT

The Department of Environmental Protection Rule 06 CMR Ch. 375, Section 10 (the “DEP Noise Rule”) is amended by adding the following new Section I:

I. Sound Level Limits and Measurements for Wind Turbine Projects.

(1) Applicability:

The terms of this section shall apply to grid-scale wind energy developments as defined by 35-A M.R.S.A. §3451.6 and small-scale wind energy developments governed by 35-A M.R.S.A. §3456, hereinafter referred to as “Wind Turbine Projects,” and shall supersede any provisions in Section 10.A through 10.H. of this Rule inconsistent with the terms set forth below.

(2) Modeling:

(a) Point Source/ Line Source:

When submitting predictive modeling in a sound study in support of an application for a Wind Turbine Project, the applicant shall use line source propagation decay rates (3 dBA per doubling of distance) out to a distance of approximately L/π where L is the length of the line source before using point source propagation rates (6 dBA per doubling of distance) and shall include in the sound report the basis for the calculations used. These calculations shall be performed by calculating the sound propagation in each octave band from 6 hz through 10,000 Hz. Where manufacturer sound data does not specify the sound power for any octave band the sound power shall be estimated based on the assumption that the sound power increases by 3/4/5 dB per octave. Results shall be reported as dBA and dBC contours down to 30 dBA and 40 dBC plus a table showing the octave band sound pressure levels at each receiving property.

(b) Long-Term Background Sound Measurements:

All data recordings shall be a series of contiguous ten (10) minute measurements. The measurement objective is to determine the quietest ten minute period at each location of interest. Nighttime test periods are preferred unless daytime conditions are quieter. The following data shall be recorded simultaneously for each ten (10) minute measurement period: dBA data includes LA90, LA10, LAeq and dBC data includes LC90, LC10, and LCEq. Record the maximum wind speed at the microphone during the ten minutes, a single measurement of temperature and humidity at the microphone for each new location or each hour whichever is oftener shall also be recorded. A ten (10) minute measurement contains valid data provided: Both LA10 minus LA90 and

LC10 minus LC90 are not greater than 10dB and the maximum wind speed at the microphone is less than 2 m/s during the same ten (10) minute period as the acoustic data.

(c) Coherence:

Predictive modeling shall include the effect of combining sounds of multiple turbines with similar spectral and temporal content.

(d) Atmospheric stability:

Modeling shall include predictive sound levels at night under conditions of atmospheric stability.

(e) Uncertainty factors:

Sound level estimates for predictive monitoring shall add a (i) a 2 dBA uncertainty factor to the manufacture's rated operating sound level at full turbine power (IEC 61400-11) and (ii) a 3 dBA uncertainty factor for sound propagation predictions using ISO 9613-2. The modeling shall also exclude attenuation factors except for atmospheric absorption. Ground absorption shall be 0 and there should be no attenuation due to ground cover or vegetation.

(3) Sound Limitations:

Sound from Wind Turbine Projects during routine operations during the nighttime, as measured at protected locations, shall meet all of the following requirements:

(a) The predicted or measured Leq (from turbine's sound immissions) in dBA shall be no louder than 5 dB above the A-weighted pre-operation nighttime background LA90; and

(b) The predicted or measured Leq (from turbine's sound immissions) in dBC shall be no louder than 20 dB above the C-weighted pre-operation nighttime background LC90; and

(c) The maximum noise from wind turbines during nighttime shall be no greater than 35 dBA and 55 dBC (Leq) at any non-participating receiving property; and

(d) The nearest turbine to a protected location is no closer than 1 mile.

(4) SDRS; Tonality Measurements.

(a) In determining whether a sequence of repetitive sounds constitutes Short Term Duration Repetitive Sounds, the lowest sound level in a sequence will be compared to the highest sound level in the sequence.

(b) If there are more than 2 sequences where peak to valley is 5 dBA or more in an hour, a 5dBA penalty shall be applied against the sound level limitations as set forth in subsection 3 above.

(c) Tonal sounds shall be measured in accordance with ANSI S12.9-2005/Part 4.

(d) If tonal sounds are predicted or found in post-constructional monitoring, the overall sound level limitations shall be reduced by 5dBA. If the tone occurs at a frequency below 500 Hz the penalty shall also apply to dBC limits.

(e) If there is substantial uncertainty as to whether SDRS or tonal sounds will occur in the routine operations of the wind turbine project, the Department will apply the 5 dbA penalties as described above, subject to removal if post-construction compliance testing shows the absence of SDRS or tonal sounds.

(5) Health Effects.

Given the public health concerns expressed in the Preamble of this Section and the emerging scientific evidence on the health effects of wind turbine noise, the Department will take appropriate measures to protect residents living near a wind turbine facility when credible evidence is submitted that indicates a risk that the health and well being of residents will or may be adversely affected by noise propagated by a wind turbine project even if the sound limitations in subsection 3 above are complied with at the pre-construction modeling stage or the post-construction routine operating phase..

(6) Noise Easements:

Noise Easements will be given effect under Section 10.C.5(s) only if the applicant submits to the Department a written statement of the disclosures given to the resident or owner executing the noise easement which adequately discloses the public health risks associated with the noise expected to be propagated in relation to the property that is the subject of the easements.

(7) Post-Construction Compliance:

(a) Compliance measurements shall be submitted by the licensee to the Department for review and approval no later than 12 months from the commencement of operations of the wind turbine project and annually thereafter.

(b) If the Department receives a bona fide noise related complaint, it shall promptly forward the same to the licensee together with a notice that the burden shall be on the licensee to reasonably satisfy the Department that, notwithstanding the noise related complaint, the licensee is operating in compliance with sound limitations at the location and under the conditions and operating modes

replicating the complaint.

(c) Failure of the licensee to make such a showing within 30 days of the notice by the Department of a noise related with reliable and credible documentation of compliance shall result in a determination of non-compliance by the Department.

(d) If the Department notifies a licensee that it has made a determination of non-compliance, the applicant will submit within 60 days for a review and approval a revised operating protocol that demonstrates that the project will be in compliance at all protected locations surrounding the development. Unless otherwise approved by the Department, the applicant's revised operating protocol will require noise mitigation procedures to be in place to reduce sound levels to compliance at all times for day and/or night operations as required to render the project in compliance.

(e) Within 30 days of approval of a revised operating protocol, the applicant will submit documentation of compliance with sound limitations with the revised operating protocols in place, according to the requirement of this Rule.

(f) If the Department issues a determination that the applicant has demonstrated compliance with sound limitations during routine operations as a result of post-construction monitoring, it shall give notice thereof to any party that has been an interested party in the application process to give those who qualify as aggrieved parties to file an appeal to the Board of Environmental Protection or to the courts as provided by law.

BASIS STATEMENT

1. The DEP Noise Rule was last amended in 1989.
2. At the time of the last amendment to the DEP Noise Rule, the Department of Environmental Protection (the "DEP") had no experience with the licensing of grid-scale wind energy projects.
3. Noise generated from the operation of wind turbine projects is unique and significantly different from noise generated from other common industrial and commercial operations, including traffic, rail and air transportation noise. Differences include: (a) amplitude modulation of audible sounds, (b) a dominance of dynamically modulated infrasonic and low frequency acoustic energy, (c) noise is emitted from high above the ground resulting in a pervasive and omnipresent character that dominates the soundscape, and (d) capable of inducing building resonance and other structural responses to airborne acoustic energy. These differences, combined with location of the industrial wind turbines in otherwise quiet rural and wilderness together with nighttime operation, make noise emitted by industrial scale wind turbines more dominating than noise from other common noise sources and causes more adverse effects on the

adjacent community's health and welfare than sounds generated from other sources for which the current rules were developed.

4. The existing DEP Noise Rule does not provide for the adequate control of high frequency audible day and nighttime noise from wind turbine projects and as a result does not prevent adverse public health effects. The current 45 dBA limit specified in the DEP Noise Rule is too high for rural and wilderness communities. The DEP Noise Rule does not address the higher annoyance and disturbance effects caused by the wind turbines unique and pervading noise. It does not take into consideration the impact on rural and wilderness communities with naturally low background sound levels, especially at nighttime, that results from the increase in decibel levels resulting from routine operation of wind turbines when compared to the pre-development community noise levels.

5. The existing DEP Noise Rule does not require any measurement or control of infrasonic and low frequency noise propagated by wind turbine projects which can cause adverse public health consequences.

6. The existing DEP Noise Rule does not provide for minimum setback requirements.

7. The existing DEP Noise Rule does not contain sufficient and valid measurement requirements to assure that applicants for wind energy projects properly predict the amount of noise that projects will generate under routine operations conditions.

8. The existing DEP Noise Rule does not take into account sufficiently amplitude modulation, a feature of wind power noise that is uniquely annoying.

9. The existing DEP Noise Rule does not contain adequate provisions for the post-construction monitoring of compliance with applicable sound limits and mitigation of operations from licensed operations and, as interpreted by the DEP, allows the DEP to accept uncertainties in noise modeling in applications under the Site Law on the assumption that sound levels generated by the operation of a project in excess of regulatory limits can be adequately mitigated after construction as part of compliance monitoring.

10. The existing DEP Noise Rule also does not require notification of interested parties to a DEP determination that the applicant has demonstrated post-construction compliance with the sound limitations of the Noise Rule, with an opportunity for aggrieved parties to appeal such a determination. This defect is exacerbated to the extent that the DEP issues a license to an applicant for a wind turbine project notwithstanding the uncertainties of the noise modeling on the grounds that the issue can be examined in post-construction monitoring of compliance.

11. The existing DEP Noise Rule does not protect against but instead allows the approval and operation of wind turbine projects harmful to the health and welfare of residents in proximity to the project without requiring wind turbine developments to meet the "no adverse effect on the natural environment" standard of the Site Location Law (38 M.R.S.A. Section 484.3) apart from whatever sound limitations are set forth in the Rule. It does not prevent excessive noise that could degrade the health and welfare of nearby neighbors.

12. The proposed amendment to the DEP Noise Rule is designed to address all of the foregoing deficiencies.
13. Scientific studies and reports that support these proposed rule changes include the following:
 - a. Ebbing Acoustics, “Some Limitations and Errors in Current Turbine Noise Models (July 2009).
 - b. C.E. Ebbing, “Applied Acoustics Handbook.”
 - c. NASA, Hubbard & Shepherd, “Wind Turbine Acoustics” (1990).
 - d. George W. Kamperman & Richard James, “Simple Guidelines for Siting Wind Turbine to Prevent Health Risks,” NOISE-CON, Dearborn, Michigan ((July 28-31, 2008).
 - e. George W. Kamperman & Richard James, “The ‘How To’ Guide to Siting Wind Turbines To Prevent Health Risks From Sound” (October 28, 2008).
 - f. Frank H. Brittain & Marlund E. Hale, “Some Limitations of Ray-Tracing Software for Predicting Community Noise from Industrial Facilities,” NOISE-CON, Dearborn, Michigan (July 28-30, 2008).
 - g. Hawkins on Modeling, ASHRAE Guide for ILFN effects, The Effects of Low-Frequency Noise and Vibration on People, [Colin H. Hansen](#), Hessler C-Wt Limits for rural areas (1986).
 - h. Maine State Planning Office Technical Assistance Bulletin # 4 and Model Wind Energy Facility Ordinance August 27, 2009.
 - i. Daniel J. Alberts. “Addressing Wind Turbine Noise” Revised Oct. 2006.
 - j. Eja Pedersen and Kerstin Waye, “Perception and Annoyance Due to Wind Turbine Noise – a Dose – Response Relationship,” J. Acoust. Soc. Am. 116 (2004).
 - k. Eja Pedersen and Kerstin Waye. “Wind Turbines-Low Level Noise Sources Interfering With Restoration?,” Environmental Res. Lett. 3 (2008).
 - l. Frits van den Berg, Eja Pedersen, Jelte Bouma & Roel Bakker. “ WINDFARMperception, Visual and Acoustic Impact of Wind Turbine Farms on Residents,” June 3, 2008
 - m. Eja Pedersen, Frits van den Berg, Roel Bakker & Jelte Bouma. “Response to

Noise from Modern Wind Farms in the Netherlands,” J Acoust. Soc. Am 126 (2), August 2009.

- n. Eja Pedersen. “Third International Meeting on Wind Turbine Noise,” Aalborg Denmark 17-19 June 2009.”
- o Kerstin Waye. “Perception and Environmental Impact of Wind Turbine Noise,” Inter-Noise 2009 (August 23-26.2009 Ottawa Canada).
- p. Minnesota Department of Health Environmental Health Division. “Public Health Impacts of Wind Turbines,” May 22, 2009.
- q. Keith Stelling & Carmen Krogh. “Summary of Recent Research on Adverse Health Effects of Wind Turbines” 20 October 2009.
- r. World Health Organization. “Night Noise Guidelines for Europe” (2009).
- s. World Health Organization, “Night Noise Guidelines” (2007).
- t. Dr. Christopher Hanning, “Sleep Disturbance and Wind Turbine Noise,” June 2009.
- v. Dr. Christopher Hanning, “Wind Turbine Noise, Sleep and Health,” April 2010.
- w. W. David Colby, M.D., et als, “Wind Turbine Sound and Health Effects: An Expert Panel,” Prepared for the American Wind Energy Association and the Canadian Wind Energy Association, December 2009.
- x. Brett Horner, et als. “Wind Energy Industry Acknowledgement of Adverse Health Effects”, prepared by the Society for Wind Vigilance (January 2010).
- y. Geoff Leventhall, “Low Frequency Noise. What We Know, What We do not Know and What We would Like to Know.”