

**BEFORE THE PUBLIC UTILITIES COMMISSION  
OF THE STATE OF SOUTH DAKOTA**

**IN THE MATTER OF THE APPLICATION OF  
CROWNED RIDGE, LLC FOR A FACILITIES PERMIT TO  
CONSTRUCTION 300 MEGAWATT WIND FACILITY**

**Docket No. EL19-003**

**REBUTTAL TESTIMONY AND EXHIBITS  
OF RICHARD LAMPETER**

**May 24, 2019**

**INTRODUCTION AND QUALIFICATIONS**

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**Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

A. My name is Richard Lampeter. My business address is 3 Mill & Main Place, Suite 250, Maynard, MA 01754.

**Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

A. I am employed at Epsilon Associates, Inc. (“Epsilon”). I am an Associate at the company and manage the Acoustics Group.

**Q. PLEASE DESCRIBE YOUR BACKGROUND AND QUALIFICATIONS**

A. I have over 15 years of experience in conducting impact assessments for various developments across the United States. Prior to joining Epsilon, I graduated from Lyndon State College in Vermont with a B.S. in Environmental Science. While at Epsilon, I have been involved in approximately 90 wind energy projects evaluating potential impacts from sound and/or shadow flicker. The projects I have worked on ranged in size from 1.5 megawatts (“MW”) to over 300 MW. I utilize the WindPRO software package to calculate shadow flicker durations in the vicinity of a project on both a worst-case and expected basis. As part of project evaluations, I have assisted in refinements in wind turbine layouts to minimize shadow flicker at residences, evaluated curtailment options, and analyzed the impact of existing vegetation to modeled shadow flicker durations. My other areas of expertise include the measurement of ambient sound levels, modeling sound levels from proposed developments, evaluation of conceptual mitigation, and compliance sound level measurements. I have conducted impact assessments for power generating facilities, commercial developments, industrial facilities, and transfer stations. In addition to conducting and/or managing the impact assessments, I have presented the results of the analyses at public meetings to county and township boards. Additional detail regarding my education, background and experience is contained in my curriculum vitae, which is attached as Exhibit RL-R-1.

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**Q. HAS THIS TESTIMONY BEEN PREPARED BY YOU OR UNDER YOUR DIRECT SUPERVISION?**

A. Yes.

**Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION?**

A. No.

**Q. PLEASE DESCRIBE THE PURPOSE OF YOUR REBUTTAL TESTIMONY.**

A. The purpose of my testimony is to respond to Staff witness David Hessler and the Intervenor's proposed conditions as set forth in Staff witness Darren Kearney's Exhibit DK-8.

**SOUND STUDY**

**Q. STAFF WITNESS HESSLER'S TESTIMONY AT PAGE 3, LINES 11-22 ASSERTS THAT CROWNED RIDGE WIND, LLC ("CRW") SHOULD HAVE CONDUCTED A BASELINE SOUND SURVEY(S) TO INFORM THE DESIGN OF THE WIND PROJECT. DO YOU AGREE?**

A. I do not agree with Mr. Hessler that a baseline sound level of existing conditions should have been conducted. The applicable sound level limits in the counties are based on sound generated from wind turbines at either the property line or at a non-participating structure (residence, business, or government building). Collecting baseline ambient sound levels would be of minimal value as it is not applicable to these limits. This is because to evaluate the limits one simply compares the modeling sound pressure level to the sound level limit stated in the regulation. It would not involve combining the existing sound levels with predicted future sound levels due to the wind turbines or calculating a delta between total future sound levels (Project + Existing) and the existing ambient sound levels. Therefore, sound level modeling is sufficient to evaluate these limits. In addition, evaluating an increase over background limit is problematic as there are many



1 factors which impact sound levels, making it difficult to assign one number as the  
2 background sound level. For example, sound levels will vary over time and will vary  
3 under differing wind conditions. In addition, ambient sound can be presented using  
4 different metrics, which in turn results in different sound levels. This type of limit, i.e.,  
5 increase over background, leads to greater uncertainty for the developer\owner\operator  
6 as compared a static Project Only sound level limit.

### 7 8 INFRASOUND

9 **Q. THE INTERVENORS' PROPOSED CONDITIONS 6, 7, AND 23 (KEARNEY**  
10 **EXHIBIT DK-8) INCLUDE REQUIREMENTS FOR CRW TO MEASURE**  
11 **INFRASOUND. DO YOU AGREE INFRASOUND SHOULD BE MEASURED?**

12 **A.** I do not agree. Low frequency noise and infrasound are present in the environment due  
13 to other sources besides wind turbines. For example, refrigerators, air conditioners, and  
14 washing machines generate infrasound and low frequency sound, as do natural sources  
15 such as ocean waves. The frequency range of low frequency sound is generally from 20  
16 hertz ("Hz") to 200 Hz, and the range below 20 Hz is often described as infrasound.  
17 However, audibility can extend to frequencies below 20 Hz if the energy is high enough.  
18 Since there is no sharp change in hearing at 20 Hz, the division between low frequency  
19 noise and infrasound should only be considered practical and conventional. The  
20 threshold of hearing is standardized for frequencies down to 20 Hz (Acoustics - Normal  
21 equal-loudness-level contours, International Standard ISO 226:2003, International  
22 Organization for Standardization, Geneva, Switzerland, (2003)).

23  
24 Also, the Massachusetts Department of Environmental Protection ("MA DEP") and the  
25 Massachusetts Department of Public Health commissioned an expert panel who found

1 that: “Claims infrasound from wind turbines directly impacts the vestibular system have  
2 not been demonstrated scientifically. Available evidence shows that the infrasound levels  
3 near wind turbines cannot impact the vestibular system.” (*Wind Turbine Health Impact*  
4 *Study: Review of Independent Expert Panel*, Massachusetts Department of  
5 Environmental Protection and Massachusetts Department of Public Health, January  
6 2012.) (attached as Exhibit RL-R-2).

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8 As noted in a report prepared for the National Association of Regulatory Utility  
9 Commissioners (“NARUC”) in 2011, “the widespread belief that wind turbines produce  
10 elevated or even harmful levels of low frequency and infrasonic sound is utterly untrue as  
11 proven repeatedly and independently by numerous investigators...” (Assessing Sound  
12 Emissions from Proposed Wind Farms & Measuring the Performance of Completed  
13 Projects, NARUC, prepared by Hessler Associates, Inc., October 2011.) (attached as  
14 Exhibit RL-R-3).

15  
16 The findings presented in the peer reviewed journal article I co-authored (*Low frequency*  
17 *noise and infrasound from wind turbines*, R. O’Neal et al, *Noise Control Engineering J.*,  
18 59(2), 2011.), which is attached as Exhibit RL-R-4, found for the wind turbines studied  
19 that there was no audible infrasound either outside or inside homes at 1,000 feet from a  
20 wind turbine. Additional findings included that sound levels met the American National  
21 Standards Institute (“ANSI”) standard for low frequency noise in bedrooms, classrooms,  
22 and hospitals, met the ANSI standard for thresholds of annoyance from low frequency  
23 noise, and met the ANSI standard for vibration of light-weight walls or ceilings. In homes

1 there may be slightly audible low frequency noise beginning at around 50 Hz (depending  
2 on other sources of low frequency noise); however, the levels are below criteria and  
3 recommendations for low frequency noise within homes.  
4

#### 5 SOUND MONITORING

6 **Q. THE INTERVENORS' PROPOSED CONDITION 6 (KEARNEY EXHIBIT DK-8)**  
7 **WOULD REQUIRE A PRECONSTRUCTION SOUND STUDY ANALYSIS,**  
8 **INCLUDING INFRASOUND, OF NON-PARTICIPATING PROPERTIES,**  
9 **OUTSIDE AND INSIDE THE PRINCIPLE STRUCTURE TO BE CONDUCTED**  
10 **BY A THIRD-PARTY. DO YOU AGREE WITH SUCH AN APPROACH?**

11 A. A pre-construction sound study as described is not necessary. A pre-construction sound  
12 study sufficient to address the regulatory requirements has already been conducted. That  
13 study, submitted by CRW witness Jay Haley, modeled future operational sound levels  
14 and compared those sound levels to each county's sound level limit. Since the sound  
15 level limit in each county is a single sound pressure level and not individual limits for  
16 particular frequencies, the collection of specific infrasound measurements is unnecessary  
17 to evaluate compliance with respect to these sound level limits.

18  
19 A pre-construction measurement program would not be needed for the reasons discussed  
20 previously in the response to Hessler's comment regarding pre-construction sound level  
21 measurements.

22 **Q. THE INTERVENORS' PROPOSED CONDITION 7 (KEARNEY EXHIBIT DK-8)**  
23 **WOULD REQUIRE CRW TO CONDUCT SOUND MONITORING, INCLUDING**



1           **INFRASOUND, DURING CONSTRUCTION. DO YOU AGREE THAT SOUND**  
2           **MONITORING, INCLUDING INFRASOUND, SHOULD BE COMPLETED**  
3           **DURING CONSTRUCTION?**

- 4    A.    I am unaware of any specific applicable state or county sound limit during construction.  
5           In my experience, sound level limits for the construction of wind energy facilities are  
6           atypical. Nonetheless, I understand that CRW witness Mark Thompson will address how  
7           CRW will implement measures to mitigate sound during construction.

8  
9    **Q.    THE INTERVENORS' PROPOSED CONDITION 7 (KEARNEY EXHIBIT DK-8)**  
10       **WOULD REQUIRE CRW TO CONDUCT SOUND MONITORING, INCLUDING**  
11       **INFRASOUND, DURING OPERATION AND MAINTENANCE. DO YOU**  
12       **AGREE THAT SOUND MONITORING, INCLUDING MONITORING OF**  
13       **INFRASOUND, SHOULD BE COMPLETED DURING OPERATION AND**  
14       **MAINTENANCE?**

- 15   A.    I agree that a condition on post-construction sound monitoring of operating conditions  
16           would be appropriate, but do not agree that a condition requiring sound monitoring  
17           during maintenance or that monitoring of infrasound is necessary or appropriate. The  
18           Commission's past permits require post-construction sound monitoring. For example, in  
19           Dakota Range I and II, Crocker Wind Farm, and most recently in Dakota Range III, the  
20           Commission ordered the following: "The Project, exclusive of all unrelated background  
21           noise, shall not generate a long-term average sound pressure level (equivalent continuous  
22           sound level,  $L_{eq}$ ), as measured over a period of at least two weeks, defined by  
23           Commission Staff, that includes all integer wind speeds from cut in to full power . . . ."

1 Inclusion of this condition in the facility permit for the CRW wind facility would address  
2 the monitoring of sound during operation. Since the sound level limit in each county is a  
3 single sound pressure level and not individual limits for particular frequencies, the  
4 collection of specific infrasound measurements is unnecessary to evaluate compliance  
5 with respect to these sound level limits.

6  
7 Sound level limits are typically applied to standard operating conditions. Therefore, the  
8 sound limits, such as those presented in the county ordinances and implemented by the  
9 Commission in past cases, would not be applicable to limited and intermittent  
10 maintenance sounds that occur over the course of the project's life.

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12 **Q. THE INTERVENORS' PROPOSED CONDITION 7 (KEARNEY EXHIBIT DK-8)**  
13 **WOULD REQUIRE CRW TO CONDUCT SOUND MONITORING, INCLUDING**  
14 **INFRASOUND, DURING DECOMMISSIONING. DO YOU AGREE THAT**  
15 **SOUND MONITORING, INCLUDING INFRASOUND, SHOULD BE**  
16 **COMPLETED DURING DECOMMISSIONING?**

17 A. No, I do not. Similar to construction, I am unaware of any state or county limit on sound  
18 during decommissioning. Therefore, the monitoring of sound during this temporary  
19 condition would be unnecessary.

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1 POST CONSTRUCTION SOUND MONITORING

2 METHODOLOGY AND REPORTING

3 **Q. THE INTERVENORS' PROPOSED CONDITIONS 19, 20, AND 21 (KEARNEY**  
4 **EXHIBIT DK-8) WOULD REQUIRE CRW TO MEASURE SOUND DBA AT L<sub>10</sub>.**  
5 **DO YOU AGREE WITH THIS APPROACH?**

6 A. I do not. Based on my experience, the L<sub>eq</sub>, or equivalent sound level, is the most widely  
7 used metric in the United States and the appropriate sound level metric for evaluating  
8 sound level impacts from wind energy facilities. As I stated previously, three recent  
9 permits in South Dakota have required post construction sound level monitoring using the  
10 L<sub>eq</sub> metric.

11  
12 In addition, the L<sub>eq</sub> is directly comparable to the model output of pre-construction  
13 predictive models provided by CRW witness Jay Haley, as the modeling incorporates the  
14 L<sub>eq</sub> sound power levels provided by the wind turbine manufacturers.

15  
16 The L<sub>10</sub>, or the sound level exceeded 10 percent of the time, is more susceptible to wind  
17 gusts and other extraneous events than the L<sub>eq</sub>, which can result in elevated sound levels  
18 unrelated to the operation of the wind turbines.

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21 **Q. THE INTERVENORS' PROPOSED CONDITION 19 (KEARNEY EXHIBIT DK-**  
22 **8) WOULD REQUIRE CRW TO ENGAGE A THIRD PARTY TO MEASURE**  
23 **SOUND EVERY YEAR OUTSIDE AND INSIDE NON-PARTICIPATING**  
24 **LANDOWNERS' HOMES WITHIN 2 MILES OF THE BOUNDARY**  
25 **FOOTPRINT AND THE WAVERLY SCHOOL. DO YOU AGREE WITH**  
26 **UTILIZING SUCH AN APPROACH?**

27 A. No. A condition to require sound level measurements every year at all non-participating  
28 homes is onerous and unnecessary. All compliance sound level evaluations are done at a  
29 reasonable subset of possible monitoring locations considering distance, modeled sound

1 levels, turbine types, and proximity to other monitoring locations in order to determine  
2 compliance for the facility as a whole.

3  
4 As the sound level limits are exterior limits, there is no additional value in attempting to  
5 collect sound levels within a residence, which would be more difficult to obtain, subject  
6 to extraneous noise (conversations, television, etc.), and would be lower than sound  
7 levels measured at the exterior of the home. In other words, Mr. Haley's modeling would  
8 only indicate what would be experienced outdoors, and, therefore, the sound level  
9 experienced indoors due to the wind turbines would be less due to the sound transmission  
10 loss of the house itself.

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12 **Q. THE INTERVENORS' PROPOSED CONDITION 19 (KEARNEY EXHIBIT DK-**  
13 **8) WOULD REQUIRE CRW TO CONDUCT SOUND MONITORING DURING**  
14 **EVEN NUMBERED YEARS IN THE SPRING AND FALL FOR 14 DAYS 24**  
15 **HOURS CONTINUOUS. DURING THE ODD NUMBERED YEARS THE**  
16 **MEASUREMENT WOULD BE IN THE SUMMER AND WINTER FOR 14 DAYS**  
17 **24 HOURS CONTINUOUSLY. DO YOU AGREE WITH SUCH AN APPROACH?**

18 **A.** I disagree with the approach proposed. One properly designed sound level measurement  
19 program of an adequate duration is sufficient to determine compliance with respect to sound  
20 at the wind energy facility.

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22 **SOUND THRESHOLDS**

23 **Q. THE INTERVENORS' PROPOSED CONDITIONS 19, 20, AND 21 (KEARNEY**  
24 **EXHIBIT DK-8) WOULD REQUIRE THAT NOISE NOT EXCEED 40 DBA L<sub>10</sub>**  
25 **AT THE PROPERTY LINE OF A NON-PARTICIPATING PROPERTY,**  
26 **INCLUDING DURING CONSTRUCTION, MAINTENANCE, OPERATION, AND**  
27 **DECOMMISSIONING. THE REQUIREMENT WOULD BE ENFORCED IN ALL**  
28 **AREAS WITHIN 2 MILES OF THE PROJECT BOUNDARY FOOTPRINT AND**



1           **WITHIN 2 MILES OF ANY HAUL ROAD FOR THE LIFE OF THE PROJECT.**  
2           **DO YOU AGREE WITH SUCH AN PROPOSAL?**

- 3    A.    I disagree with the proposed sound level limit. This proposal is unnecessarily more  
4           restrictive on multiple levels as compared to either of the Grant or Codington county sound  
5           level requirements. Further, the Intervenor's have provided no support for lowering the sound  
6           limit to a 40 dBA threshold for non-participants at their property line. Also, this proposal  
7           incorporates the L<sub>10</sub> sound level metric, which as described earlier, is not the preferred metric  
8           from a technical standpoint and is more restrictive. Thus, the Intervenor's condition is not  
9           supported or appropriate.

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11   **Q.    THE INTERVENORS' PROPOSED CONDITION 19 (KEARNEY EXHIBIT DK-**  
12           **8) WOULD REQUIRE SOUND TO BE MEASURED AT 40 DBA L<sub>10</sub> BY A**  
13           **THIRD PARTY EVERY YEAR OUTSIDE AND INSIDE NON-PARTICIPATING**  
14           **LANDOWNERS' HOMES WITHIN 2 MILES OF THE BOUNDARY**  
15           **FOOTPRINT AND THE WAVERLY SCHOOL. DO YOU AGREE WITH SUCH**  
16           **A PROPOSAL?**

- 17    A.    I disagree with this proposed requirement. As stated previously, 40 dBA and L<sub>10</sub> are  
18           inconsistent with the Grant and Codington county requirements, and there is no support  
19           provided by the Intervenor's for imposing a 40 dBA limit. Further, compliance sound level  
20           evaluations are done at a reasonable subset of possible monitoring locations considering  
21           distance, modeled sound levels, turbine types, and proximity to other monitoring locations in  
22           order to determine compliance for the facility as a whole. Since the sound level limits are  
23           exterior limits, there is no additional value in attempting to collect sound levels within a  
24           residence given that they are more difficult to obtain, subject to extraneous noise  
25           (conversations, tv, etc.), and would be lower than sound levels measured at the exterior of the  
26           home. Thus, I do not support the Intervenor's proposed condition.

27  
28   **Q.    DOES THIS CONCLUDE YOUR TESTIMONY?**

- 29    A.    Yes.



STATE OF MASSACHUSETTS            )  
  ) ss  
COUNTY OF MIDDLESEX            )

I, Richard Lampeter, being duly sworn on oath, depose and state that I am the witness identified in the foregoing prepared testimony and I am familiar with its contents, and that the facts set forth are true to the best of my knowledge, information and belief.

  
Richard Lampeter

Subscribed and sworn to before me this 24<sup>th</sup> day of May, 2019.

SEAL

  
Notary Public  
**ERIK R. REXTORIK**  
My Commission Expires July 29, 2022