

**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

1

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

4 A. Yes.

5

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

8 A. No.

9

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

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

14

15

SOUND STUDY

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

20 A. I do not agree with Mr. Hessler that a baseline sound level of existing conditions should
21 have been conducted. The applicable sound level limits in the counties are based on
22 sound generated from wind turbines at either the property line or at a non-participating
23 structure (residence, business, or government building). Collecting baseline ambient
24 sound levels would be of minimal value as it is not applicable to these limits. This is
25 because to evaluate the limits one simply compares the modeling sound pressure level to
26 the sound level limit stated in the regulation. It would not involve combining the existing
27 sound levels with predicted future sound levels due to the wind turbines or calculating a
28 delta between total future sound levels (Project + Existing) and the existing ambient
29 sound levels. Therefore, sound level modeling is sufficient to evaluate these limits. In
30 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).

7
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.

11
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.

POST CONSTRUCTION SOUND MONITORING

METHODOLOGY AND REPORTING

Q. THE INTERVENORS' PROPOSED CONDITIONS 19, 20, AND 21 (KEARNEY EXHIBIT DK-8) WOULD REQUIRE CRW TO MEASURE SOUND DBA AT L₁₀. DO YOU AGREE WITH THIS APPROACH?

A. I do not. Based on my experience, the L_{eq}, or equivalent sound level, is the most widely used metric in the United States and the appropriate sound level metric for evaluating sound level impacts from wind energy facilities. As I stated previously, three recent permits in South Dakota have required post construction sound level monitoring using the L_{eq} metric.

In addition, the L_{eq} is directly comparable to the model output of pre-construction predictive models provided by CRW witness Jay Haley, as the modeling incorporates the L_{eq} sound power levels provided by the wind turbine manufacturers.

The L₁₀, or the sound level exceeded 10 percent of the time, is more susceptible to wind gusts and other extraneous events than the L_{eq}, which can result in elevated sound levels unrelated to the operation of the wind turbines.

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

A. No. A condition to require sound level measurements every year at all non-participating homes is onerous and unnecessary. All compliance sound level evaluations are done at a 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.

11
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.

21
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 L₁₀
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 L₁₀ 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.

10
11 **Q. THE INTERVENORS' PROPOSED CONDITION 19 (KEARNEY EXHIBIT DK-**
12 **8) WOULD REQUIRE SOUND TO BE MEASURED AT 40 DBA L₁₀ 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 L₁₀ 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 24th day of May, 2019.

SEAL


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