

**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 JAY HALEY**

**May 24, 2019**

INTRODUCTION

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

A. My name is Jay Haley. My business address is 3100 DeMers Ave., Grand Forks, ND, 58201.

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

A. I am a Partner in EAPC Wind Energy and work as a Wind Engineer.

**Q. WHAT ARE YOUR RESPONSIBILITIES?**

A. My responsibility was to conduct the sound and shadow/flicker studies for Crowned Ridge Wind, LLC (“CRW”).

**Q. ARE YOU THE SAME JAY HALEY WHO SUBMITTED DIRECT TESTIMONY IN THIS PROCEEDING ON JANUARY 30, 2019 AND SUPPLEMENTAL DIRECT TESTIMONY ON APRIL 1, 2019?**

A. Yes.

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

A. Yes.

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

A. The purpose of my rebuttal testimony is to response to the direct testimony of Staff witness Darren Kearney, Staff witness David Hessler, Intervenor witness John Thompson, and Intervenor’s proposed conditions as set forth in Staff witness Darren Kearney’s Direct Testimony, Exhibit DK-8.

Shadow Flicker Modeling

1  
2 **Q. STAFF WITNESS KEARNEY'S TESTIMONY AT PAGE 10, LINES 16-18**  
3 **REQUESTS THAT CRW FILE UPDATED FIGURES FROM APPENDIX D OF**  
4 **THE SHADOW FLICKER STUDY TO SHOW THE TOTAL EXPECTED**  
5 **LEVELS OF SHADOW FLICKER ON RECEPTORS FROM ALL TURBINES,**  
6 **WHETHER THOSE TURBINES ARE PROPOSED TO BE CONSTRUCTED BY**  
7 **CROWNED RIDGE WIND OR ANOTHER PROJECT. DO AGREE WITH THIS**  
8 **REQUEST?**

9 **A.** Yes. Let me start by pointing out that I did explain the cumulative impacts from all  
10 turbines, whether they be proposed by CRW, Crowned Ridge Wind II, or Dakota Range  
11 Wind I and II, in my supplemental testimony on page 6. The tables in Exhibit 3 of the  
12 supplemental testimony show the cumulative results from all turbines in CRW, Crowned  
13 Ridge Wind II, and Dakota Range Wind I and II. Also, attached is the Iso-line map book  
14 for cumulative shadow flicker to my testimony as Exhibit JH-R-1. This document has  
15 also been updated to the most current land status.

16  
17 **Q. STAFF WITNESS KEARNEY'S TESTIMONY AT PAGE 10, LINES 22-33**  
18 **STATES THAT IF CRW CANNOT OBTAIN A WAIVER FOR NON-**  
19 **PARTICIPATING RECEPTOR (CR1-C61-NP), WHO IS EXPECTED TO**  
20 **EXPERIENCE 49 HOURS AND 6 MINUTES OF SHADOW FLICKER PER**  
21 **YEAR, THAT CRW SHOULD ELIMINATE THE USE OF THE WIND TURBINE**  
22 **CAUSING THE SHADOW/FLICKER IR AUTOMATICALLY CONTROL THE**  
23 **TURBINE SO THAT THE RECEPTOR DOES NOT EXPERIENCE OVER 30**  
24 **HOURS OF SHADOW/FLICKER PER YEAR. HE ALSO REQUESTS THAT**  
25 **CROWNED RIDGE PROVIDE IN REBUTTAL TESTIMONY THE FINAL PLAN**  
26 **FOR LIMITING SHADOW/FLICKER AT RECEPTOR (CR1-C61-NP). WHAT**

1           **IS YOUR UNDERSTANDING OF CRW'S FINAL PLAN FOR THIS**  
2           **RECEPTOR?**

3    A.    The final plan for this receptor is set forth in the rebuttal testimony of witnesses Wilhelm  
4           and Massey. If CR1-16 is curtailed by 20 hours per year, this reduces the shadow-flicker  
5           at receptor CR1-C61-NP to less than 30 hours of shadow flicker per year, with 21:33  
6           hours contributed by Dakota Range turbines. This was determined by running the model  
7           with all turbines from CRW, Crowned Ridge Wind II and Dakota Range I and II, and  
8           then with and without turbine CR1-16.

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Sound Modeling

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12   **Q.    STAFF WITNESS KEARNEY'S TESTIMONY AT PAGE 12, LINES REQUESTS**  
13           **THAT CROWNED RIDGE WIND UPDATE THE FIGURES FOR APPENDIX D**  
14           **TO 5 THE SOUND STUDY THAT PROVIDE THE ISO-LINES FOR SOUND**  
15           **LEVELS THAT ACCOUNT FOR THE CROWNED 6 RIDGE, DAKOTA RANGE,**  
16           **AND CROWNED RIDGE II WIND TURBINE ARRAYS? DO AGREE WITH**  
17           **THIS REQUEST?**

18    A.    Yes, and I have attached a sound Iso-line map book to my testimony as Exhibit JH-R-2.  
19           This document has been updated to the most current land participation status.

20

21   **Q.    STAFF WITNESS HESSLER'S TESTIMONY AT PAGE 3, LINES 11-20 CLAIMS**  
22           **THAT THE CRW SOUND STUDY SHOULD HAVE EVALUATED OR**  
23           **ASSESSED THE POTENTIAL NOISE IMPACT FOR THE PROJECT ON THE**  
24           **COMMUNITY THROUGH A BASELINE SOUND SURVEY. DO YOU AGREE?**

25

26    A.    No, I do not. In my years of performing these studies, I have not been asked or required  
27           to assess community perception based on the difference between the turbine noise and the

1 background noise. For the Crowned Ridge project, I was hired to perform the noise study  
2 pertaining to the noise emissions from the turbines. There was no requirement to perform  
3 background noise measurements, as there was no regulatory requirement to do so.  
4

5 **Q. STAFF WITNESS HESSLER'S TESTIMONY AT PAGE 6, LINES 17-19**  
6 **RECOMMENDS THAT THE ENTIRE CRW PROJECT SHOULD ADOPT THE**  
7 **GRANT COUNTY ORDINANCE LEVEL OF NO MORE THAT 45 DBA AT ALL**  
8 **NON-PARTICIPATING RESIDENCES. DO YOU AGREE?**

9  
10 A. I have modeled the entire project using the Grant County Ordinance. The results show  
11 that with turbines CR-40 and CR-17 being removed and replaced by turbines CR1-Alt42  
12 and CR1-Alt45, all Codington non-participating residences are at or below 45 dBA, and  
13 the highest noise level at a Codington participating residence is 47.9 dBA. For Grant  
14 County, all non-participants are below 45 dBA and all but 3 participants are below 45  
15 dBA except for three, with the highest of those being 45.3 dBA. The results of this  
16 model rule is in Exhibit JH-R-3.

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18 **Q. STAFF WITNESS HESSLER'S TESTIMONY AT PAGE 5 LINES 17 TO PAGE 6**  
19 **LINE 5 CLAIMS THAT CRW SHOULD MOVE 16 PRIMARY TURBINE**  
20 **LOCATIONS TO ALTERNATIVE LOCATIONS TO REDUCE THE DBA FOR**  
21 **NON-PARTICIPANTS FROM A RANGE OF 43-45 DBA TO 41 OR 42 DBA. DID**  
22 **YOU MODEL STAFF WITNESS HESSLER'S RECOMMENDATION?**

23 A. Yes. The results are attached as Exhibit JH-R-4. As these results show, only 13  
24 Receptors of the 50 that were above 42 dBA were lowered to a level of 42 dBA or less by  
25 eliminating the 16 suggested turbines.  
26

Non-Participant

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2 **Q. INTERVENOR WITNESS THOMPSON SUBMITTED TESTIMONY**  
3 **EXPLAINING THAT HE IS NOT PARTICIPATING IN THE PROJECT. DOES**  
4 **IS NON-PARTICIPATION CHANGE YOUR STUDY RESULTS?**

5 A. No, since there is no occupied structure on the property, it does not change any of the  
6 study results.  
7

8 **Q. WHERE THERE OTHER PROPERTY STATUS CHANGES THAT IMPACTED**  
9 **YOUR SOUND AND SHADOW/FLICKER STUDY RESULTS?**

10 A. Yes, I have confirmed with Tyler Wilhelm, the Project Manager, that the data that was  
11 provided to me is accurate and complete with respect to who is a participant and who is a  
12 non-participant. I have attached a shadow flicker Iso-line map book to my testimony as  
13 Exhibit JH-R-2. This document has also been updated to the most current land  
14 participation status.  
15

16 **Q. GIVEN THE CONSIDERATION OF CUMULATIVE IMPACTS FROM DAKOTA**  
17 **RANGE AND LAND STATUS CHANGES ARE THERE RECEPTORS THAT**  
18 **ARE NO LONGER IN COMPLIANCE WITH EITHER THE GRANT COUNTY**  
19 **OR CODINGTON COUNTY ORDINANCE?**

20  
21 A. Yes, those receptors are CRI-C46-NP and CRI-C58-NP.  
22

23 **Q. HAS CRW ELIMINATED PRIMARY TURBINES AND ACTIVATED**  
24 **ALTERNATIVE TURBINES IN RESPONSE TO THE SOUND RESULTS?**

25  
26 A. Yes, it is my understanding that CRW will not use primary turbines CRI-40 and CRI-17  
27 and will activate alternative turbines CRI-Alt42 and CRI-Alt45.  
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29 **Q. BASED ON THESE CHANGES TO TURBINES ARE THE SOUND LEVELS IN**  
30 **COMPLIANCE WITH THE GRANT AND CODINGTON COUNTY**  
31 **ORDINANCES?**

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A. Yes, this is shown in Exhibit JH-R-5.

**Q. DOES THE ENTIRE CRW PROJECT ALSO MEET THE STANDARD THAT ALL NON-PARTICIPANTS ARE BELOW 45 DBA AND ALL PARTICIPANTS ARE BELOW 50 DBA WHEN MEASURED 25 FEET FROM THEIR RESIDENCE?**

A. Yes, this is shown in Exhibit JH-R-3.

**Intervenors Proposed Conditions**

**Q. THE INTERVENORS' PROPOSED CONDITION 2 (KEARNEY EXHIBIT DK-8) WOULD REQUIRE A 2 MILE SETBACK OF WIND TURBINES FROM WAVERLY SCHOOL. BASED ON YOUR MODELING, WHAT LEVEL OF SOUND WILL BE EXPERIENCED AT THE SCHOOL?**

A. The distance from the school to the nearest wind turbine is 5,892 feet, which is a Crowned Ridge II turbine. The nearest Crowned Ridge turbine is 6,208 feet away from the school. The sound pressure level at the school would be 39.4 dBA.

**Q. BASED ON YOUR MODELING, WHAT LEVEL OF SHADOW/FLICKER WILL BE EXPERIENCED AT THE SCHOOL?**

A. The distance from the school to the nearest wind turbine is 5,892 feet, which is a Crowned Ridge II turbine. The nearest Crowned Ridge turbine is 6,208 feet away from the school. There would be 46 minutes per year of shadow flicker at the school.

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2 **Q. THE INTERVENORS' PROPOSED CONDITION 18 (KEARNEY EXHIBIT DK-**  
3 **8) WOULD REQUIRE "NO FLICKER SHALL BE ALLOWED TO CROSS NON-**  
4 **PARTICIPATING LANDOWNER'S PROPERTY LINE." BASED ON YOUR**  
5 **EXPERIENCE MODELING WHAT AMOUNT OF SHADOW AND FLICKER IS**  
6 **CROSSING A NON-PARTICIPATING LANDOWNER'S PROPERTY LINE?**

7 A. Shadow flicker occurs when a moving shadow passes over a constrained opening such as  
8 a window or doorway of a building. A moving shadow out in an open field is not  
9 considered to be "flicker". The specialized software programs that calculate shadow  
10 flicker are designed to calculate flicker that would occur inside of a building by modeling  
11 the size and location of windows because the shadow flicker impacts occur inside the  
12 buildings. They do not calculate shadow movement across property lines.

13

14 **Q. DO YOU AGREE WITH THE CONDITION THAT NO FLICKER SHALL BE**  
15 **ALLOWED TO CROSS NON-PARTICIPATING LANDOWNER'S PROPERTY**  
16 **LINE?**

17 A. No, I do not agree with this condition. A moving shadow crossing a property line is not  
18 shadow flicker. Shadow flicker occurs when the shadow moves across a window in a  
19 room. The shadow in that case causes the light intensity level in the room to fluctuate,  
20 causing a flickering sensation. This does not happen out in an open field.

21

22 **Q. DOES THIS CONCLUDE YOUR SUPPLEMENTAL TESTIMONY?**

23 A. Yes, it does.





