

BEFORE THE SOUTH DAKOTA PUBLIC UTILITIES COMMISSION

DOCKET EL19-026

IN THE MATTER OF THE APPLICATION OF TATANKA RIDGE WIND, LLC FOR A
PERMIT OF A WIND ENERGY FACILITY IN DEUEL COUNTY, SOUTH DAKOTA

SUPPLEMENTAL DIRECT TESTIMONY OF JON THURBER
ON BEHALF OF THE COMMISSION STAFF
OCTOBER 28, 2019



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EXHIBITS

Exhibit_JT-3 Sound Condition

Exhibit_JT-4 U.S. Fish & Wildlife Service South Dakota Whooping Crane Migration Corridor

Exhibit_JT-5 Commission Staff Outstanding Discovery to Tatanka Ridge Wind, LLC

1 **III. CUMULATIVE SOUND IMPACTS**

2
3 **Q. Please summarize your understanding of Commissioner Fiegen’s concerns**
4 **regarding cumulative sound impacts.**

5 A. ARSD 20:10:22:13 requires the Commission to consider the cumulative impacts of siting
6 a proposed facility in combination with any facility that is existing or under construction:
7

8 *“...The environmental effects shall be calculated to reveal and assess*
9 *demonstrated or suspected hazards to the health and welfare of human, plant*
10 *and animal communities which may be cumulative or synergistic consequences*
11 *of siting the proposed facility in combination with any operating energy*
12 *conversion facilities, existing or under construction...”*
13

14 In response to Commission Staff data request 2-23, the Applicant identified three non-
15 participating residences that were impacted by sound from the Tatanka Ridge Wind
16 Project and were within one mile of an existing Buffalo Ridge II turbine. A summary of
17 the sound impacts at the three residences is provided below:
18

ID	Distance to Nearest Tatanka Turbine (feet)	Tatanka Project Sound Level (dBA)	Distance to Nearest Buffalo Ridge II Turbine (feet)	Buffalo Ridge II Project Sound Level (dBA)	Cumulative Sound Level (dBA)	Sound Increase (dBA)
H14	6,803	31.2	2,727	41.2	41.6	0.4
H17	6,949	31.6	4,790	37.7	38.7	1.0
H25	4,416	34.8	5,020	37.3	39.2	1.9

19
20 Commissioner Fiegen had concerns regarding the proposed sound condition in the
21 Settlement Stipulation because sound levels would have been evaluated for the Tatanka
22 Ridge Wind Project exclusive of any other wind facilities for compliance with the
23 regulatory limits. My understanding is Commissioner Fiegen would like the sound
24 condition to be modified to verify compliance with the regulatory limit by evaluating the
25 cumulative sound impacts of all adjacent wind facilities.
26
27
28

1 **Q. Please explain Commission Staff’s analysis of the cumulative sound impacts**
2 **associated with this Project.**

3 A. On Figure 8 of the Application, the Company provided a map that shows where adjacent
4 wind facilities are located in relation to the Tatanka Ridge Wind Project. Buffalo Ridge II,
5 permitted by the Commission in Docket EL08-031, is an operating wind facility located to
6 the south of the Tatanka Ridge Wind Project. Deuel Harvest South, a proposed wind
7 facility in the early development stage, is located to the North and East of the Tatanka
8 Ridge Wind Project. ARSD 20:10:22:13 directs the Commission to consider adjacent
9 facilities that are either operating or under construction for cumulative impacts. As such,
10 Commission Staff believes the Commission should only consider the Buffalo Ridge II
11 wind facility for cumulative impacts with the Tatanka Ridge Wind Project.

12
13 In response to Commission Staff data request 1-3, the Applicant stated that it did not
14 account for the Buffalo Ridge II turbines in the sound study. While the Company
15 indicated that the Buffalo Ridge II Project is more than 1.5 miles away from the Tatanka
16 Ridge Wind Project, Commission Staff wanted the Company to calculate the cumulative
17 sound levels for the non-participants located between the two wind facilities to assess
18 the cumulative impacts. Commission Staff evaluated the non-participants modeled in
19 the sound study that are located within one mile of an existing Buffalo Ridge II turbine.

20
21 **Q. What was Commission Staff’s assessment of the cumulative sound impacts of the**
22 **Tatanka Ridge Wind Project and the Buffalo Ridge II Wind Project?**

23 A. The predicted cumulative sound levels of the non-participating residences that are
24 located within one-mile of a Buffalo Ridge II turbine ranged between 38.7 dBA and 41.6
25 dBA, leaving a sizable buffer below Commission Staff’s recommended regulatory limit of
26 45 dBA. The dominant source of sound at the three non-participating receptors is an
27 existing Buffalo Ridge II turbine, not the proposed Tatanka Ridge Wind Project.
28 Effectively, turbines are proposed to be added to the existing environment at a distance
29 between 4,416 ft. and 6,949 ft. (approximately 0.8 miles and 1.3 miles) from the three
30 non-participating residences and are predicted to increase the sound level by an amount
31 between 0.4 dBA and 1.9 dBA.

32
33

1 **Q. Is the cumulative sound assessment performed by Commission Staff consistent**
2 **with its past practice?**

3 A. Yes. In Docket EL19-003, Commission Staff hired expert sound witness David Hessler
4 to analyze the sound impacts of the Crowned Ridge I Wind Project. To assess the
5 cumulative sound impacts, Hessler reviewed the results of the sound model that
6 included turbines from the Crowned Ridge, Dakota Range, and Crowned Ridge II wind
7 facilities to determine what actions, if any, were necessary to mitigate sound concerns.
8 No changes to the project-only sound compliance monitoring method were proposed in
9 Docket EL19-003 after the cumulative impacts were mitigated.

10

11 **Q. Did Commission Staff consult with Hessler on the cumulative sound impacts in**
12 **this Project?**

13 A. Yes, I did. If the facts indicated that the predicted increases were significant or the
14 cumulative sound levels were approaching the regulatory limit, Commission Staff would
15 have explored changes to the testing procedure.

16

17 **Q. During deliberations, Commissioner Fiegen mentioned there were multiple non-**
18 **participating residences near Commission Staff's recommended regulatory limit**
19 **of 45 dBA limit. Do you have any comments regarding that statement?**

20 A. Non-participating receptors H83 and H137 have a predicted sound level of 44 dBA.
21 However, these residences are located north of the Tatanka Ridge Wind Project Area,
22 multiple miles north of the Buffalo Ridge II Project, and are not expected to experience
23 any material sound impacts from Buffalo Ridge II turbines.

24

25 In addition, the sound study includes a +2.0 dBA adjustment to the turbine sound power
26 level. Commission Staff considers this a conservative modeling assumption as Hessler
27 did not include that adjustment in the sound models he prepared for other wind facilities.
28 Without a 2.0 dBA adjustment, the predicted sound levels show a reasonable buffer
29 below the regulatory limit.

30

31 **Q. Will Commission Staff call Hessler as a witness at the evidentiary hearing?**

32 A. Unfortunately, Hessler has a prior commitment and is unavailable to testify at the
33 hearing.

34

1 **Q. Please provide Commission Staff’s recommended permit condition for sound.**

2 A. Pursuant to guidance provided by ARSD 20:10:22:13, Commission Staff had the
3 Applicant calculate predicted cumulative sound impacts. Commission Staff determined
4 the sound levels are predicted to increase by an imperceptible¹ amount as a result of
5 cumulative effects, and the cumulative sound levels are predicted to be well below the
6 regulatory limit. As a result, the non-participants will not notice a difference in sound at
7 their residence and the cumulative effects are not considered to be a hazard to the
8 health and welfare of humans. Therefore, Commission Staff proposes no changes to
9 the sound compliance testing method ordered by the Commission in prior wind facility
10 permits. Commission Staff recommends the Commission approve Condition 26 as
11 shown on Exhibit_JT-3.
12

13 **IV. SAFETY RISK ASSOCIATED WITH ICE THROW**

14
15 **Q. What measures is Tatanka Ridge Wind proposing to reduce the risks associated
16 with ice throw?**

17 A. On Page 126 of the Application, the Applicant committed to “monitor icing conditions of
18 the turbine. If severe icing condition[s] occur, control systems will either automatically or
19 manually shut down turbines until icing is no longer a concern.”
20

21 **Q. What technology will be employed at each turbine to detect and assess ice
22 buildup?**

23 A. In response to Commission Staff data request 2-19, the Applicant provided the following
24 information on the technology employed at each turbine:
25

26 “The turbine control system and meteorological measurements at each turbine
27 will be used to detect and assess ice buildup. The control system evaluates wind
28 speed, temperature, and rotor RPM’s to determine if there is ice on the blades. In
29 case of ice detection, the turbine controller disconnects the wind turbine
30 generator system from the grid and the rotor is brought to a standstill or rotates at
31 a very low speed known as idling or ready position. An alarm message is sent to
32 the Control Center through what is known as a SCADA sever, System Control
33 and Data Acquisition. The turbine does not restart until the rotor blades are
34 detected to be free of ice or the operator has satisfied himself of the ice-free
35 condition of the rotor blades, has acknowledged the ice alarm message and
36 restarts the turbine.”

¹ In response to Commission Staff data request 2-33(a), the Applicant stated that when comparing similar sources of sound an increase of 3 dBA is generally considered the threshold of a perceivable difference.

1 **Q. In addition to employing technology, what setback is Tatanka Ridge Wind**
2 **proposing to mitigate the potential hazard associated with ice throw?**

3 A. Tatanka Ridge Wind proposes setbacks consistent with Deuel County and South Dakota
4 laws to address the risks associated with ice throw. According to Table 5-1 of the
5 Application, turbines will be setback at least 500 ft. or 1.1 times the height of the wind
6 turbine from any property line, unless waived by the land owner through a written
7 agreement. The same setback is implemented for public right-of-way. In Deuel County,
8 non-participating residences and business shall not be less than four times the height of
9 the wind turbine.

10
11 Based on the smallest wind turbine proposed by Tatanka Ridge Wind (GE 2.3 – 116,
12 148 meters or approximately 485.6 ft. tip height), the minimum setback from non-
13 participating residences and businesses will be at least 1,943 ft, and the minimum
14 setback from any property line and public right-of-way will be at least 535 ft.

15
16 **Q. Does Commission Staff have any concerns with Tatanka Ridge Wind’s proposed**
17 **setback to address the risks associated with ice throw?**

18 A. No. The Applicant’s proposal is consistent with state and county law, the turbine
19 manufacturer’s recommendation, and Commission precedent.

20
21 **Q. Is Tatanka Ridge Wind’s proposed ice detection and mitigation measure**
22 **consistent with the permit condition ordered by the Commission in recent wind**
23 **facility permits?**

24 A. It is similar. The permit condition ordered by the Commission in recent wind facility
25 permits to address the risk associated with ice throw is the following:

26
27 Applicant will use two methods to detect icing conditions on turbine blades: (1)
28 sensors that will detect when blades become imbalanced or create vibration due
29 to ice accumulation; and (2) meteorological data from on-site permanent
30 meteorological towers, on-site anemometers, and other relevant sources that will
31 be used to determine if ice accumulation is occurring. These control systems will
32 either automatically shut down the turbine(s) in icing conditions (per the sensors)
33 or Applicant will manually shut down turbine(s) if icing conditions are identified
34 (using referenced data). Turbines will not return to normal operation until the
35 control systems no longer detect an imbalance or when weather conditions either
36 remove icing on the blades or indicate icing is no longer a concern. Applicant will
37 pay for any documented damage caused by ice thrown from a turbine. (emphasis
38 added)

1
2 The ice detection and mitigation condition proposed by the parties in this proceeding
3 was the following (“settlement condition”):
4

5 The Project will monitor icing conditions of the turbines while under severe
6 weather conditions. If these conditions occur during normal business hours or
7 outside of such hours, the control systems will automatically shut down the
8 affected turbines until severe icing is no longer a concern. In some cases, during
9 normal business hours, site personnel may manually shutdown turbines that
10 pose a significant concern. Turbine control sensors will detect the reduction of
11 efficiency of the blade due to ice buildup by utilizing meteorological data from on-
12 site permanent meteorological towers, on-site anemometers, and other relevant
13 turbine control parameters to determine if ice accumulation is occurring. These
14 control systems will either automatically shut down the turbine(s) in severe icing
15 conditions or Applicant may manually shut down turbine(s) if these conditions
16 pose a significant concern. Applicant will pay for any documented damage
17 caused by ice thrown from a turbine. (emphasis added)
18

19 **Q. Did the Applicant commit to pay for any damages caused by ice thrown from a**
20 **turbine in the settlement condition?**

21 A. Yes, the Applicant agreed it would be responsible for damages.
22

23 **Q. Please summarize your understanding of the Commissioners’ concerns regarding**
24 **the proposed ice detection and mitigation condition.**

25 A. My understanding is the Commission was uncomfortable with how the adjectives in the
26 settlement condition could potentially change the definition. As underlined above,
27 Commission Staff believes the following changes highlight the Commissioners’
28 concerns:
29

- 30 (1) specifying the Project will monitor icing conditions “while under severe weather
31 conditions”;
32 (2) changing “concern” to a “significant concern”; and
33 (3) changing “icing condition” to a “severe icing condition”.
34

35 Commissioners requested that the Applicant and Commission Staff define these
36 adjectives during the October 15 Commission Meeting, and no party could provide a
37 definition that would address the Commission’s concerns.
38
39

1 **Q. Do you have any comments on the Commissioner’s concerns regarding the**
2 **adjectives included in the ice detection and mitigation condition?**

3 A. The goal of the condition is to ensure a procedure is in place to prevent ice thrown or
4 shed from wind turbines from endangering the public health and safety. In combination
5 with the proposed setbacks, Commission Staff believes the settlement condition
6 accomplished that goal. However, Commission Staff supports removing “severe”,
7 “significant”, and “while under severe weather conditions” from the proposed settlement
8 condition to address the Commission’s concerns.

9

10 **Q. Why did Commission Staff support the settlement condition as proposed?**

11 A. SDCL 49-41B-22 requires that the Commission determine whether the Applicant has
12 established that (in part):

13

14 (2) The facility will not pose a threat of serious injury

15 (3) The facility will not substantially impair

16 (4) The facility will not unduly interfere

17

18 Adjectives such as *serious*, *substantially*, and *unduly* are under consideration in this
19 docket and, arguably, may be considered ambiguous. Commission Staff does not view
20 the adjectives in the settlement condition as materially different than the adjectives in the
21 Applicant’s statutory burden of proof. The Commission is responsible for making a
22 reasonable interpretation based on a set of facts and the purpose of the law in this
23 proceeding.

24

25 In addition, even with removing the adjectives, there remains ambiguous terms in the
26 settlement condition subject to interpretation. What constitutes an icing “condition”?
27 How much ice on a turbine blade qualifies as ice “accumulation”? When do the icing
28 conditions no longer cause a “concern”? These terms are not clearly defined, and
29 Commission Staff is not advocating that a definition is needed. The Commission will
30 need to interpret the condition based on a specific set of facts if a complaint is filed with
31 the Commission.

32

33

34

1 V. POTENTIAL IMPACT TO WHOOPING CRANES

2
3 **Q. Did the Applicant identify whooping cranes as a Federally Threatened and**
4 **Endangered Species with the potential to occur within or near the Project in the**
5 **Application?**

6 A. No.

7
8 **Q. Did Commission Staff take issue with the Applicant's assessment of whooping**
9 **cranes?**

10 A. No. Since the Project Area is located to the east of where ninety-five percent of
11 migratory whooping crane observations have occurred, Commission Staff did not
12 disagree with the Applicant's assessment. See Exhibit_JT-4 for the U.S. Fish and
13 Wildlife Service South Dakota Whooping Crane Migration Corridor using state sightings.

14
15 **Q. Did Commission Staff propose a condition that would require the Applicant to**
16 **establish and implement a procedure for preventing whooping crane collisions**
17 **with wind turbines during operations?**

18 A. No. Consistent with past practice, Commission Staff did not advocate for a condition
19 because the Project Area is located outside the whooping crane migration corridor.

20
21 **Q. What condition has Commission Staff proposed to minimize impacts to whooping**
22 **cranes for wind facilities located within the migration corridor?**

23 A. In Docket EL19-007, Commission Staff and Triple H Wind Project, LLC agreed to the
24 following condition to address potential impacts to whooping cranes:

25
26 Applicant shall establish a procedure for preventing whooping crane collisions
27 with turbines during operations by establishing and implementing formal plans for
28 monitoring the project site and surrounding area for whooping cranes during
29 spring and fall migration periods throughout the operational life of the project and
30 shutting down turbines and/or construction activities within 2 miles of whooping
31 crane sightings. The South Dakota Game, Fish, and Parks will be consulted on
32 the procedure to minimize impacts to whooping cranes.
33

1 **Q. Is the Applicant willing to agree to this condition to address the Commissioner**
2 **Hanson's concerns?**

3 A. Commission Staff asked the Applicant if they were willing to agree to this condition in
4 Commission Staff data request 5-1. See Exhibit_JT-5 for details. Commission Staff has
5 not received a formal response from the Applicant prior to drafting this testimony.
6

7 **Q. What procedures have the subsidiaries of Avangrid, LLC, implemented at the**
8 **adjacent South Dakota wind facilities to Tatanka Ridge Wind to minimize impacts**
9 **to whooping cranes?**

10 A. Commission Staff requested that the Applicant provide the mitigation strategies
11 implemented by Avangrid, LLC's subsidiaries at following adjacent wind facilities in
12 Commission Staff data request 5-2: Buffalo Ridge I (24 turbines), Buffalo Ridge II (105
13 turbines), Coyote Ridge (39 turbines), and MinnDakota (36 turbines). Commission Staff
14 has not received a response to this inquiry, but the response will be filed as an exhibit at
15 the evidentiary hearing.
16

17 **Q. Will Commission Staff call Tom Kirschenmann, Deputy Director of Wildlife**
18 **Division and Chief of the Terrestrial Resources Section at the South Dakota Game,**
19 **Fish, and Parks, as a witness to discuss potential impacts to whooping cranes at**
20 **the evidentiary hearing?**

21 A. Yes, Kirschenmann is available to testify at the hearing.
22

23 **Q. Does this conclude your testimony?**

24 A. Yes, this concludes my written supplemental direct testimony.

The Project, exclusive of all unrelated background noise, shall not generate a sound pressure level (10-minute equivalent continuous sound level, Leq), of more than 50 dBA when all turbines are producing full acoustic output at any currently occupied participating residence unless the owner of the residence has signed a waiver, or more than 45 dBA at any currently occupied non-participating residence unless the owner of the residence has signed a waiver. Applicant shall, in support of the evaluation of a formal noise complaint and upon Commission formal request, conduct field surveys or provide post-construction monitoring data verifying compliance with specified noise level limits. If the measured wind turbine noise level exceeds 50 dBA at any currently occupied participating residence or 45 dBA at any non-participating residence where the owner of the residence has not signed a waiver, then the Applicant shall take whatever steps are necessary in accordance with prudent operating standards to meet this standard. Sound monitoring will not be repeated in a representative area during any five-year period unless operational or maintenance changes result in a reasonable assumption of higher turbine sound levels.

The post-construction monitoring survey, upon Commission formal request, shall be executed as follows:

- a) The post-construction monitoring survey shall follow the applicable portions of American National Standards Institute (ANSI) standard S12.9 Part 3, and other acoustical standard relating to equipment and calibration specifications.
- b) Noise levels shall be measured continuously for at least two weeks, or until such time that a sufficient number of valid 10-minute Leq periods are acquired to determine compliance to a reasonable degree of scientific certainty. At a minimum, data must be collected for multiple 10-minute periods on at least two different nights when the nearest turbines are operating at full acoustic emissions, and background noise levels are sufficiently low such that the measured total noise level can be assumed to equal the turbine-only noise level. During the post-construction monitoring survey, windscreens will be used to protect microphones and minimize effects from self-generated wind-induced noise.
- c) Measurements shall be conducted in proximity to the complainant's dwelling. In the event of multiple complainants, representative locations will be at a select number of non-participating and participating residences (where access can be arranged) with the highest expected noise levels based on acoustic modeling. Typically, 4 to 6 measurement locations total.
- d) Measurements shall be conducted using sound level meters meeting ANSI Type 1 specifications. An anemometer shall be placed within 20 feet of each microphone, and at a height of 2 meters above the ground.

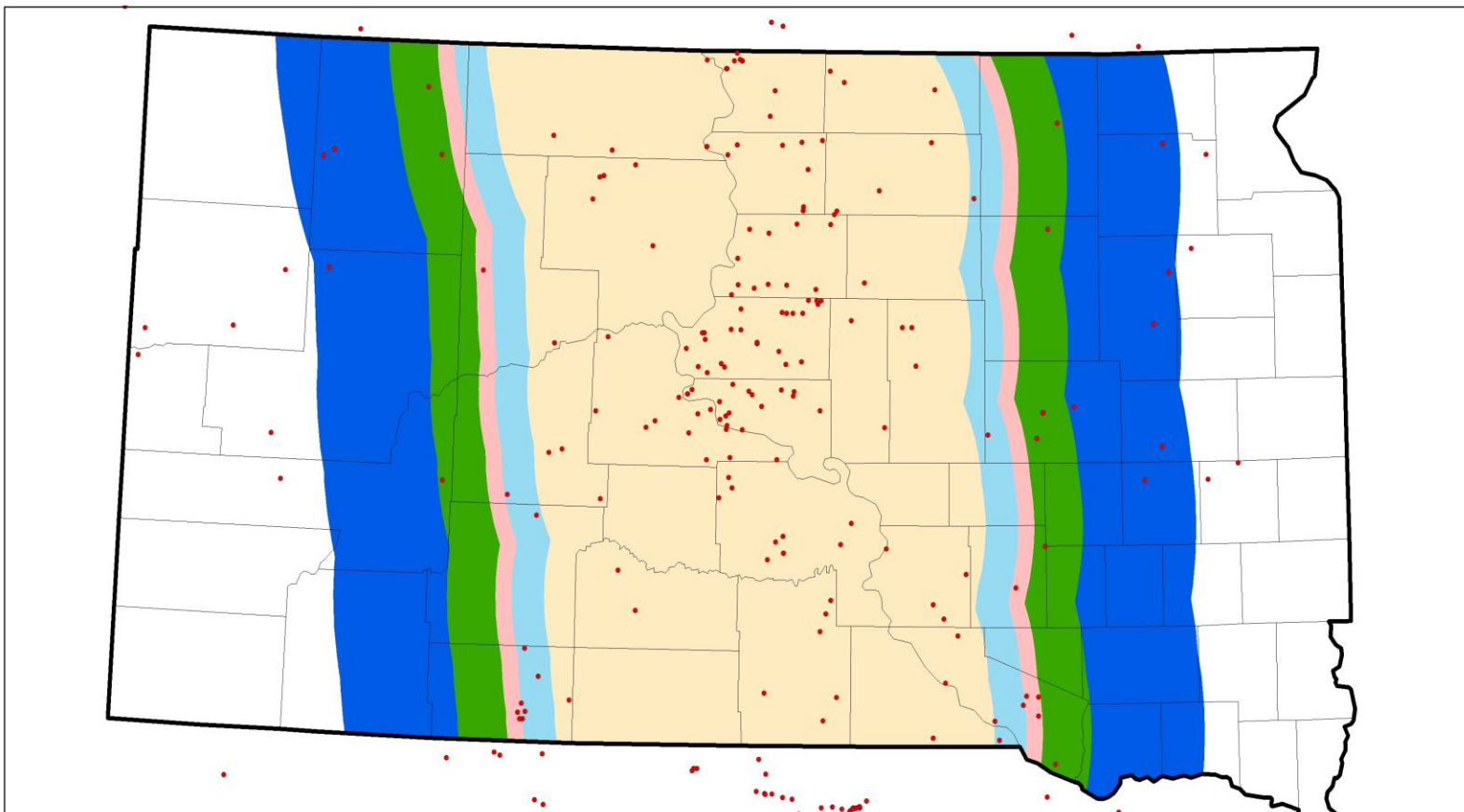
- e) The measurement data shall be analyzed as follows:
 - i. Analyze those data acquired when the ~4 turbines nearest to each measurement location are operating at full capacity (80% electric power or more, which typically occurs at a hub-height wind speed of 6 m/s or greater).
 - ii. Discard those samples measured when the 10-minute average ground wind speed is 5 m/s or greater.
 - iii. Remove transient background noise (i.e. occasional traffic, activities of residents, farming activities, and wind gusts) per ANSI S12.9 Part 3.
 - iv. Remove continuous background noise by conducting turbine shut-downs, where the background noise is measured directly. Shut down testing will be conducted in a controlled manner, where consultant's staff may be present on site to observe and listen during the tests and/or collect audio recordings. Shut down testing shall continue until enough data has been collected when ground wind speeds are between approximately 2 and 5 m/s that a repeatable pattern is observed in the measured background noise level. Background noise levels will be subtracted from total noise levels measured during these wind conditions to calculate turbine-only noise levels.
 - v. Review of the frequency spectra of potential turbine-only samples to identify and remove outliers (spectral shape clearly differing from those samples measured under very low (less than 2 m/s) ground wind conditions, which are the samples most representative of turbine-only noise).
- f) Compare the resulting turbine-only noise levels to the 45 and 50 dBA limits. Compliance shall be demonstrated if all samples are less than the limits.



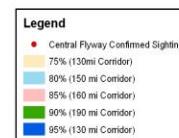
U.S. Fish & Wildlife Service

South Dakota Whooping Crane Migration Corridor Using State Sightings

Central Flyway of the United States



Produced for Ecological Services
Grand Island, NE
Current to: 2008
Basemap (Date): South Dakota Counties
Meridian:
File:



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

**IN THE MATTER OF THE
APPLICATION BY TATANKA RIDGE
WIND, LLC FOR A PERMIT OF A
WIND ENERGY FACILITY IN DEUEL
COUNTY, SOUTH DAKOTA**

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**STAFF'S FIFTH SET OF DATA
REQUESTS TO APPLICANT**

EL19-026

Below, please find Staff's Fifth Set of Data Requests to Applicant. Please specify the responder when answering each interrogatory. Should any response have subparts answered by more than one individual, identify the respondent by subpart. Consider each question ongoing and update answers as they evolve or change.

- 5-1) Will the Applicant agree to the following condition to mitigate potential impacts to whooping cranes:

Applicant shall establish a procedure for preventing whooping crane collisions with turbines during operations by establishing and implementing formal plans for monitoring the project site and surrounding area for whooping cranes during spring and fall migration periods throughout the operational life of the project and shutting down turbines and/or construction activities within 2 miles of whooping crane sightings. The South Dakota Game, Fish, and Parks will be consulted on the procedure to minimize impacts to whooping cranes.

If no, please explain why.

- 5-2) Please explain the whooping crane mitigation strategies implemented at the following adjacent wind facilities owned by Avangrid: Buffalo Ridge I, Buffalo Ridge II, Coyote Ridge, and MinnDakota.
- 5-3) Please refer to Condition 26 of the Settlement Stipulation in this docket that was not accepted by the commission (<https://puc.sd.gov/commission/dockets/electric/2019/el19-026/settlement.pdf>).
- a) How should cumulative impacts from adjacent wind facilities, such as Buffalo Ridge II, be considered when analyzing sound compliance with regulatory limits?
 - b) Does the Applicant have any proposed modifications to Condition 26 to address the concerns raised by Commissioner Fiegen during the October 15 commission meeting? Please explain.
 - c) How does the Applicant propose to analyze and measure cumulative sound impacts during post compliance testing? Should the condition be Project only, or consider all wind turbines within a reasonable proximity to the residence? Please explain.
 - d) Refer to the Applicant's response to Staff Data Request 2-33.
 - i. For Receptors H14 and H17, are the turbines associated with Buffalo Ridge II the primary source of sound when looking at the cumulative sound level for these residences?

- ii. What is the regulatory sound limit for Buffalo Ridge II? How should the Commission evaluate cumulative sound impacts when one wind facility has a higher regulatory limit than the adjacent wind farm being evaluated for cumulative impacts?
- 5-4) Refer to the Applicant's response to Commission Staff data requests 1-3 and 2-23(a). The Applicant stated "distance notwithstanding, one could not be simultaneously downwind from both projects simultaneously."
- a) Please explain the wind direction assumptions used in sound modeling software versus the downwind concept discussed in response Staff Data Request 1-3.
 - b) Is the sound modeling conservatively representing cumulative impacts based on wind direction assumptions included in software? Please explain.

Dated this 18th day of October 2019.



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