BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY CROCKER WIND FARM, LLC FOR A PERMIT FOR A WIND ENERGY FACILITY AND A 345 KV TRANSMISSION LINE IN CLARK COUNTY, SOUTH DAKOTA, FOR CROCKER WIND FARM

SD PUC DOCKET EL-17-____

PREFILED TESTIMONY OF ROB COPOULS ON BEHALF OF CROCKER WIND FARM, LLC

December 15, 2017

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I. INTRODUCTION AND QUALIFICATIONS

- 3 **Q.** Please state your name and business address.
- A. My name is Rob Copouls. I am employed by Westwood Professional Services,
 7699 Anagram Drive, Eden Prairie, Minnesota.
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7 Q. Please describe your education and experience.

8 A. I have a B.S. in civil engineering from Valparaiso University, and I am a professional 9 engineer licensed in several states. I have worked for Westwood Professional 10 Services for more than 12 years and have worked in the renewable energy field on 11 wind and solar projects for approximately 10 years. I have been a part of more than 12 100 projects, with roles ranging from project engineer to senior project manager. I 13 am currently Operations Manager for my division, which includes more than 170 14 people who assist with wind, solar, and power delivery projects. A copy of my 15 resume is included as Exhibit 1.

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Q. What is your company's role with respect to the Crocker Wind Farm Project ("Project")?

- A. Westwood Professional Services has assisted Crocker Wind Farm, LLC ("Crocker")
 with surveying, permitting support, engineering and design for the Project. I am the
 Senior Project Manager overseeing all aspects of the project for Westwood.
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- 23 II. PURPOSE OF TESTIMONY
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25 Q. What is the purpose of your Direct Testimony?

A. The purpose of my Direct Testimony is to describe the design and construction of
 the Project, provide an overview of its operation and maintenance, and discuss
 various design, construction, and operational considerations, including safety
 features, potential impacts on existing infrastructure and communications systems,
 and issues related to electromagnetic fields ("EMF") and stray voltage. I will also
 discuss the decommissioning and site restoration of the Project.

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33	Q. Please identify the sections of the Application you are sponsoring.		
34	A. I am sponsoring the following sections of the Application:		
35		•	Section 4.2: Wind Farm Facility
36		•	Section 4.3: Information Concerning Transmission Facilities
37		•	Section 4.5: Wind Farm Construction, Restoration, Operations and
38			Maintenance Procedures
39		•	Section 4.6: Transmission Facility Construction, Restoration, Operations
40			and Maintenance Procedures
41		•	Section 5.0: Decommissioning of Wind Energy Facilities
42		•	Section 6.3: Equipment Procurement, Manufacture and Delivery (Time
43			Schedule)
44		•	Section 6.4: Construction (Time Schedule)
45		•	Section 9.5.7: Telecommunications
46		•	Section 9.7.3: Transportation
47		•	Section 11.0: Reliability and Safety
48		•	Appendix A: Typical Turbine Foundation
49		•	Appendix B: Typical Transmission Structure Drawings
50		•	Appendix G: Crocker Wind Farm Telecommunication Studies
51			(Comsearch)
52		•	Appendix J: Electric and Magnetic Field (EMF) Report
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54	III.	PROJ	
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56	Q.	Please p	rovide an overview of Project facilities, including related transmission
57		facilities	
58	Α.	The prop	osed Project is an up to 400 megawatt ("MW") wind farm ("Wind Energy
59		Facility")	and an associated 345 kV transmission line ("Transmission Facility") and
60		would inc	lude the following components:
61		•	Up to 120 three-bladed, horizontal-axis wind turbines;

- 62 Up to four permanent meteorological towers ("MET towers") and Sonic • 63 Detection and Ranging ("SoDAR") or Light Range Detection and Ranging 64 ("LiDAR") units; 65 Access roads, improvements to existing public and private roads, and • 66 temporary crane paths; 67 Temporary laydown/staging areas, and temporary batch plant to mix • 68 concrete for tower foundations; 69 Operations and maintenance ("O&M") facility; 70 Underground and/or aboveground electrical collector and communication 71 systems; and 72 Project collection substation. 73 The Transmission Facility would include: 74 Approximately 5.2 miles of 345 kV bundled conductors; 75 Steel monopole structures; • 76 Temporary access roads; • 77 Temporary staging areas; and • 78 A switchyard with permanent access road. 79 80 Q. How and where will the Project interconnect to the electric grid? 81 A. The Project will interconnect at the proposed switchyard, which is approximately two 82 miles north of the town of Crocker. Specifically, the Transmission Facility's route will 83 run from the Project collection substation to the switchyard, where the power will 84 transfer to the Basin Electric Groton-to-Watertown 345 kV transmission line, which is 85 part of the SPP/WAPA Transmission line portfolio in Clark County. 86 87 Q. What is the proposed development schedule for the Project? 88 A. The Applicant has begun procurement of Project-specific equipment and is in the 89 process of procuring turbines for the Project. Turbines will be allocated to the 90 Project after meteorological and economic studies are completed to achieve the best 91 match of turbines for the Project. Equipment could start arriving on-site as early as 92 second quarter 2018, with construction beginning shortly thereafter.
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IV. PROJECT DESIGN AND CONSTRUCTION

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96 Q. From an engineering and operational design perspective, please describe the 97 turbines that may be used for the Project.

98 A. The Project would consist of up to 120 three-bladed, horizontal-axis wind turbines 99 with an energy production range of 2.0 MW to 3.45 MW. Specifically, Crocker is 100 considering the following turbine models: Gamesa G126 2.625 MW; GE 2.5-116; 101 Vestas V110 STE 2.0 MW; and Vestas V136 3.45 MW. Crocker has not yet 102 finalized the specific turbine choice for the Project and will do so prior to 103 construction. However, the configuration proposed in the Application would be the 104 same for any of the four turbine models under consideration, as well as any other 105 turbine model selected.

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All representative turbine models have active yaw and pitch regulation and
 asynchronous generations and are capable of operating with adjusted cut-in speeds
 and full blade feathering. Each model also has Supervisory Control and Data
 Acquisition ("SCADA") communication technology to control and monitor the Project.
 Additional information concerning Project turbines is included in Section 4.2.1 of the
 Application.

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114 Q. Please describe the foundations that will be constructed for the turbines.

115 A. The wind turbine towers will be connected by anchor bolts to a concrete foundation, 116 which will use a pad-and-pier tower mounting system consisting of top and bottom 117 templates. These templates consist of anchor bolts and reinforcing steel bar (rebar); 118 they are placed within the excavated portion of the turbine footing and filled with 119 concrete. The anchor bolts protrude from the concrete pad surface and the turbine 120 base is fastened to these bolts. The turbine pad dimensions are approximately 20 121 feet in above-ground diameter and typically range in depth from eight to nine feet. 122 An approximate height of one-half to one foot of the turbine pad remains above-123 grade. Geotechnical surveys, turbine tower load specifications, and cost

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considerations, among other factors, will dictate final design parameters of the foundations. Additional detail is provided in Section 4.2.1 of the Application.

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127 Q. Will the collection system be installed underground?

128 A. Generally, yes. Up to 157 trench miles of underground collector lines will be 129 installed by trenching, plowing, or, where needed, directionally boring the cables 130 underground to avoid sensitive environmental conditions. Generally, collector lines 131 will be installed underground, but cabling may go aboveground if conflicts with 132 existing underground utilities or other infrastructure cannot be resolved, and 133 aboveground cabling will resolve the conflict. Collector lines may also be installed 134 aboveground pursuant to requests by the road authority if the lines are located in 135 existing public road rights-of-way. Additional detail is provided in Section 4.2.6 of 136 the Application.

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138 Q. Could you describe the Project collection substation?

A. The Project collection substation will include a control house, power transformers, switches, metering, and other equipment needed for the safe electrical operations of the Project and interconnection to the Transmission Facility, which will interconnect the Project to the electrical grid via the switchyard. Once construction is complete, the substation will occupy an area of approximately 500 feet by 500 feet. Additional detail is provided in Section 4.2.8 of the Application.

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146 Q. Please describe the O&M facility that will be constructed for the Project.

A. The O&M facility will be co-located with the Project substation and will include an
O&M building to house office space and equipment used for Project maintenance
and operation, as well as an associated storage area. O&M buildings are typically
between 3,000 and 5,000 feet, with an adjacent parking lot. The O&M building will
require a building permit from Clark County, in which it will be located. Additional
detail is provided in Section 4.2.5 of the Application.

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154 **Q. Please discuss the design and installation of the permanent MET towers.**

A. Crocker proposes to construct up to four permanent MET towers with the potential
for a SoDAR and/or a LiDAR unit(s). The permanent MET towers will be free
standing, equal to the turbine hub height, and located around the perimeter of the
Project. Final locations will be selected based on the turbine model selected.

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Q. With respect to Project access roads, how will access road requirements differ during and after construction?

- 162 A. The Project access roads will provide access to turbines during construction, as well 163 as for maintenance and monitoring during operations. The construction corridor for 164 access roads will be approximately 120 feet wide. During construction, the access 165 roads will be approximately 34 feet to accommodate transportation of heavy 166 construction equipment, crawler cranes and Project components. After construction 167 is complete, the temporary crane should will be removed and the access roads will 168 be reduced to their permanent width of up to 20 feet. The final surface of the 169 permanent access road will be gravel. Additional information concerning access 170 roads is included in Section 4.2.3 of the Application.
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172 Q. Please describe the design of the Transmission Facility.

A. The Transmission Facility will consist of a 5.2-mile-long single circuit 345 kV
transmission line, temporary access roads and laydown/staging areas, and a
switchyard. The transmission line will be constructed on steel monopole structures
spaced in intervals of 400 to 1,000 feet. Monopole structures are generally placed
on foundations between six and 11 feet in diameter and are typically 100 to 120 feet
tall.

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The switchyard (the aboveground interconnecting facility) requires a construction workspace of approximately 16.8 acres, with the final fenced-in area anticipated to be approximately 500 feet by 500 feet. The switchyard components will be mounted on concrete pads and concrete pier foundations. For electrical and fire safety, the switchyard will be will be graveled to maintain the area free of vegetation. The area will be fenced to prevent unauthorized entry by individuals and wildlife. Once

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construction is complete, the switchyard would be maintained and operated by the utility. Additional detail is provided in Section 4.3 of the Application.

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189 Q. Has Crocker developed a route for the proposed Transmission Facility?

190 A. Yes. The proposed transmission line route ("Proposed Route") extends from the 191 Project collection substation in Section 30 of Township 119N, Range 58W, to the 192 proposed switchyard, which will be located approximately two miles north of the 193 town of Crocker in Section 9 of Township 119N, Range 58W. The Proposed Route 194 will utilize a 150-foot right-of-way plus the adjacent right-of-way where applicable, 195 but only 100 feet of the corridor are anticipated to be impacted by construction. The 196 Transmission Facility is co-located with existing county roadways or along existing 197 property lines for nearly the entire route.

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199 **Q. Describe how the Transmission Facility will be constructed.**

A. Construction of the Transmission Facility will begin after applicable federal, state,
 and local approvals have been obtained, soil conditions at structure (pole) locations
 are established, and final design is completed. The Proposed Route has been
 routed to minimize tree clearing to the extent practicable, and Crocker anticipates
 that only minimal grading will be needed because there is little elevation change
 along the Proposed Route.

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The construction staging area for the transmission facilities will likely be partially shared with that used for the Wind Energy Facility. Staging involves delivering the equipment and materials to construct the new transmission line facilities. Structures will be moved from the staging areas, delivered to staked locations, and placed within the right-of-way until the structure is set.

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213 Crocker will clear the construction area and adjacent tower assembly area of 214 vegetation. Then, the topsoil and subsoil will be excavated for the pole foundation, 215 concrete poured, and pile driven to establish the foundation. The monopole 216 structures for the Project will then be secured to the concrete foundations. After the structures are secured, the insulators will be attached to the structure arms. The
conductors and shield wires will then be strung from each structure. As construction
on each parcel is completed, disturbed areas will be restored to their original
condition to the extent practicable. Additional detail concerning construction of the
Transmission Facility is available in Section 4.6 of the Application.

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223 Q. Discuss the personnel that will be involved in the construction of the Project.

- A. Construction of the Project will involve both skilled and unskilled labor, including
 foremen, carpenters, iron workers, electricians, millwrights, and heavy equipment
 operators. A construction management company will be contracted with to provide
 to provide management level oversight, safety, coordination with the applicate and
 other stakeholders, and QA/QC. Construction of the Project is anticipated to
 generate approximately 250 jobs during construction (~200 jobs for Wind Energy
 Facility, ~50 jobs for the Transmission Facility) at peak demand.
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2 V. PROJECT OPERATION AND MAINTENANCE

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Q. Discuss the personnel that will be involved in operation and maintenance of the Project.

- A. As discussed in Section 4.5.10 of the Application, the Wind Energy Facility's
 expected life span is approximately 30 years. During this time, a maintenance crew
 will be on-site 24-hours a day, seven days a week to monitor turbine operations from
 the O&M building and conduct maintenance activities, as needed.
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The estimated service life of the Transmission Facility is approximately 40 years; operations and maintenance personnel will conduct ground and/or aerial inspections and prune or remove vegetation to ensure safe operations.

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Overall, it is predicted that, during operation and maintenance, the Project will create
approximately 18 full time jobs paying around \$1.1 million per year. Additional
detail is also included in Sections 4.6.5 and 9.7.1.2 of the Application.

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249 Q. Discuss the inspections that will be conducted and when they will occur.

A. All major components of the wind turbines will undergo routine maintenance
 according to schedules established by the component manufacturer. With respect to
 the Transmission Facility, inspections will be performed monthly by truck or air to
 ensure the line is fully functional and no encroachments on the right-of-way (e.g.,
 vegetation) are present.

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256 **Q. How will the Project be monitored between inspections?**

- A. All proposed turbine models have SCADA communication technology to control and
 monitor the Project. This system permits automatic, independent operation and
 remote supervision, allowing simultaneous on-site and off-site control of the wind
 turbines.
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262 Q. How reliable will the wind turbines and associated infrastructure be?

- A. Consistent with other utility-scale wind projects, the Wind Energy Facility isanticipated to be available at least 97 percent of the time.
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266 Q. How reliable will the Transmission Facility be?

- A. The average annual availability of transmission infrastructure is in excess of 99
 percent, and the Transmission Facility is not anticipated to deviate from this
 average.
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271 VI. DESIGN, CONSTRUCTION, AND OPERATIONAL CONSIDERATIONS

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273 Q. What safety features will be incorporated into the Project?

- A. Crocker has incorporated or will incorporate a number of safety and security
 measures to protect persons and property, including, but not limited to:
- Wind turbine towers locations set back from residences in accordance
 with or in excess of applicable regulations and industry standards;
- Wind turbine locations will comply with applicable noise requirements;

- The Project collector substation, switchyard, and O&M facility will be
 surrounded by permanent fencing;
- During construction, temporary (safety) fencing will be used to restrict
 access to the site;
- Warning signs will be in place and Project facilities (turbine tower doors,
 gates at facilities, etc.) will be locked when not in use;
- Regular maintenance and inspections will be conducted to address
 potential blade failures;
- Where necessary or requested by landowners, Crocker will construct
 gates or fences;
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• The contractor will develop and implement a construction safety plan.

With respect to the Transmission Facility specifically, the design will comply with applicable standards regarding clearance to ground, utilities, and buildings. Crocker will use proper signage and guard structures when stringing wire across roads and railroads. The Transmission Facility will also be equipped with protective devices to safeguard the public if a line or pole falls. Proper signage will also be posted. Additional detail is provided in Sections 11.1 and 11.2 of the Application.

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297 Q. How has Crocker accounted for existing infrastructure (including existing 298 communications systems) in designing the Project?

299 A. Crocker has conducted a microwave beam path analysis and sited in a manner that 300 avoids all identified microwave beam paths and communication systems. Crocker 301 also submitted a Project notification letter to the U.S. Department of Commerce 302 National Telecommunications and Information Administration ("NTIA"). NTIA 303 indicated that no federal agencies identified any concerns regarding blockage of 304 their radio frequency transmissions. However, the Department of Energy ("DOE") 305 noted the Project has potential to interfere with DOE Western operations. Western 306 has three paths that run through the Project Area from the Clark Repeater. However, 307 in a December 1, 2017 letter, the agency notes the Project will not cause problems 308 for Western.

A portion of the Project area is located within the National Oceanic and Atmospheric Administration ("NOAA") Notification Zone, meaning that impacts to the surrounding weather surveillance radar are unlikely; however, NOAA's Radar Operations Center will track the Project through completion to fully understand and anticipate any impacts. The Project team has worked with NOAA on similar issues in the past and anticipates any concerns can be addressed.

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In addition, Crocker is coordinating to determine the potential for inductive
interference on copper telephone lines owned by Interstate Telecommunications
Cooperative ("ITC") in the Project area. Crocker will enter into an agreement with
ITC to ensure any interference will be mitigated prior to construction.

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322 Additional information is provided in Section 9.5.7 of the Application.

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324 Q. Will the Project participate in the South Dakota One-Call program?

- A. Yes. The Project will utilize the One-Call program to locate underground
 infrastructure prior to construction. In addition, once construction is completed, the
 Project will register its facilities with the One-Call program.
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Q. With respect to use of existing local roads as haul roads, will Crocker coordinate with local road authorities regarding the use and restoration of those roads?

A. Yes. Crocker will coordinate with applicable local road authorities to establish road
 use agreements that will be in place before construction to ensure safe and efficient
 use and to minimize and mitigate Project impacts to haul roads. The agreements
 will also address improvements to existing roads and restoration of haul roads to
 their pre-construction condition following construction. Additional information
 concerning haul roads is included in Sections 4.2.3 and 9.7.3 of the Application.

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339 Q. What does the term EMF mean with respect to the Project?

A. The term EMF refers to electric and magnetic fields that are present around any
 electrical device. Electric fields arise from the voltage or electrical charges, and
 magnetic fields arise from the flow of electricity or current that travels along
 transmission lines, power collection (feeder) lines, substation transformers, house
 wiring, and electrical appliances.

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346 Q. Are impacts due to EMF anticipated with respect to the Project?

A. No impacts due to EMF are anticipated. Project facilities will be set back from
residences in excess of state standards, where EMF will be at background levels. In
addition, Crocker conducted an EMF study for the Transmission Facility, and the
results of that study show that EMF levels are well within industry standards. As a
result, EMF-related issues are not anticipated. Additional detail is provided in
Section 11 and Appendix J of the Application.

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354 **Q. What is stray voltage?**

355 A. Stray voltage is a natural phenomenon that is the result of low levels of electrical 356 current flowing between two points that are not directly connected. Electrical 357 systems, including farm systems and utility distribution systems, must be adequately 358 grounded to the earth to ensure continuous safety and reliability, and to minimize 359 this current flow. Stray voltage does not cause electrocution and is not related to 360 ground current, EMF, or earth currents. Stray voltage issues are usually related to 361 the distribution and service lines directly serving a farm, or wiring on a farm, affecting 362 confined animals.

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364 Q. Are impacts due to stray voltage anticipated with respect to the Project?

A. No impacts due to stray voltage are anticipated. Project design will comply with all applicable electrical code requirements, including measures (such as proper grounding) to prevent stray voltage problems. In addition, stray voltage is not an issue for the Transmission Facility, as it is not a distribution-level facility. Additional information concerning stray voltage is provided in Section 11 of the Application.

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371 Q. What steps will the Project take to prepare for a potential emergency situation 372 at the Project site during construction and when the Project is operational? 373 A. Crocker and its construction team will coordinate with first responders, including but 374 not limited to air ambulance, local sheriff's offices, and local fire services to develop 375 a emergency management plan during construction and operation of the Project. 376 Crocker will also coordinate with local first responders to offer information about the 377 Project and answer questions response teams may have regarding Project plans 378 and details. 379 380 Q. Will the Project be designed, constructed, and operated in compliance with all 381 applicable federal, state, and local regulations? 382 A. Yes. 383 384 VII. DECOMMISSIONING AND SITE RESTORATION 385 386 Q. What is the estimated life of the Project? 387 A. The anticipated life of the Project is approximately 30 years from the date of 388 commencement of commercial operation. 389 390 Q. Will the Project be decommissioned at the end of its useful life? 391 A. Once the facilities constructed have reached the end of their useful life, it may be 392 determined that it is appropriate to retrofit or otherwise upgrade the Project facilities 393 and continue operations. If retrofitting or upgrading is not done, then the Project will 394 be decommissioned. 395 396 Q. If the Project is decommissioned, will the Project comply with all applicable 397 state and local requirements for structure removal and site restoration? 398 A. Yes. Decommissioning will comply with applicable state and local requirements, 399 including the decommissioning requirements of Clark County. More specifically, 400 consistent with the terms of the wind lease and easement agreements with individual 401 landowners, Crocker will conduct various decommissioning and restoration activities,

402 including turbine removal, removal of turbine foundations to a depth of 48 inches 403 below grade, and removal and/or disassembly of other Project facilities, as 404 described in more detail in Section 5.0 of the Application.

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406 Q. Has Crocker analyzed the cost of decommissioning the Project?

407 A. A conservative decommissioning cost estimate in current dollars is between 408 \$100,000 to \$150,000 per turbine after salvage value, including associated facilities. 409 This cost estimate is based on on-site experience, labor costs, and material prices 410 from Geronimo's operating project's decommissioning plans. Because of the 411 uncertainties surrounding future decommissioning costs and salvage values, 412 Crocker will review and update the cost estimate of decommissioning and 413 restoration for the Project every five years after Project commissioning.

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415 Q. Who will be responsible for covering all anticipated decommissioning costs?

- 416 A. Crocker will be responsible for covering all anticipated decommissioning costs.
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418 VIII. CONCLUSION

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420 Q. Does this conclude your Direct Testimony?

- 421 A. Yes.
- 422
- 423 Dated this 15th day of December, 2017
- 424
- 425

Robert A. Copourt 426 427

428 **Rob Copouls**