

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



1 **I. INTRODUCTION AND QUALIFICATIONS**

2

3 **Q. Please state your name and business address.**

4 A. My name is Rob Copouls. I am employed by Westwood Professional Services,
5 7699 Anagram Drive, Eden Prairie, Minnesota.

6

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.

16

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

19 A. Westwood Professional Services has assisted Crocker Wind Farm, LLC ("Crocker")
20 with surveying, permitting support, engineering and design for the Project. I am the
21 Senior Project Manager overseeing all aspects of the project for Westwood.

22

23 **II. PURPOSE OF TESTIMONY**

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25 **Q. What is the purpose of your Direct Testimony?**

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

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Q. Please identify the sections of the Application you are sponsoring.

A. I am sponsoring the following sections of the Application:

- Section 4.2: Wind Farm Facility
- Section 4.3: Information Concerning Transmission Facilities
- Section 4.5: Wind Farm Construction, Restoration, Operations and Maintenance Procedures
- Section 4.6: Transmission Facility Construction, Restoration, Operations and Maintenance Procedures
- Section 5.0: Decommissioning of Wind Energy Facilities
- Section 6.3: Equipment Procurement, Manufacture and Delivery (Time Schedule)
- Section 6.4: Construction (Time Schedule)
- Section 9.5.7: Telecommunications
- Section 9.7.3: Transportation
- Section 11.0: Reliability and Safety
- Appendix A: Typical Turbine Foundation
- Appendix B: Typical Transmission Structure Drawings
- Appendix G: Crocker Wind Farm Telecommunication Studies (Comsearch)
- Appendix J: Electric and Magnetic Field (EMF) Report

III. PROJECT OVERVIEW

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Q. Please provide an overview of Project facilities, including related transmission facilities.

A. The proposed Project is an up to 400 megawatt (“MW”) wind farm (“Wind Energy Facility”) and an associated 345 kV transmission line (“Transmission Facility”) and would include the following components:

- 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.

93

94 **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.

106

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

113

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

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

126

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.

137

138 **Q. Could you describe the Project collection substation?**

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

145

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

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

153

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

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

159

160 **Q. With respect to Project access roads, how will access road requirements differ**
161 **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.

171

172 **Q. Please describe the design of the Transmission Facility.**

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

179

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

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

188

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.

198

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

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

206

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

212

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

217 structures are secured, the insulators will be attached to the structure arms. The
218 conductors and shield wires will then be strung from each structure. As construction
219 on each parcel is completed, disturbed areas will be restored to their original
220 condition to the extent practicable. Additional detail concerning construction of the
221 Transmission Facility is available in Section 4.6 of the Application.

222

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

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

231

232 **V. PROJECT OPERATION AND MAINTENANCE**

233

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

236 A. As discussed in Section 4.5.10 of the Application, the Wind Energy Facility's
237 expected life span is approximately 30 years. During this time, a maintenance crew
238 will be on-site 24-hours a day, seven days a week to monitor turbine operations from
239 the O&M building and conduct maintenance activities, as needed.

240

241 The estimated service life of the Transmission Facility is approximately 40 years;
242 operations and maintenance personnel will conduct ground and/or aerial inspections
243 and prune or remove vegetation to ensure safe operations.

244

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

248

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

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

255

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

257 A. All proposed turbine models have SCADA communication technology to control and
258 monitor the Project. This system permits automatic, independent operation and
259 remote supervision, allowing simultaneous on-site and off-site control of the wind
260 turbines.

261

262 **Q. How reliable will the wind turbines and associated infrastructure be?**

263 A. Consistent with other utility-scale wind projects, the Wind Energy Facility is
264 anticipated to be available at least 97 percent of the time.

265

266 **Q. How reliable will the Transmission Facility be?**

267 A. The average annual availability of transmission infrastructure is in excess of 99
268 percent, and the Transmission Facility is not anticipated to deviate from this
269 average.

270

271 **VI. DESIGN, CONSTRUCTION, AND OPERATIONAL CONSIDERATIONS**

272

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

274 A. Crocker has incorporated or will incorporate a number of safety and security
275 measures to protect persons and property, including, but not limited to:

- 276 • Wind turbine towers locations set back from residences in accordance
277 with or in excess of applicable regulations and industry standards;
- 278 • Wind turbine locations will comply with applicable noise requirements;

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

290 With respect to the Transmission Facility specifically, the design will comply with
291 applicable standards regarding clearance to ground, utilities, and buildings. Crocker
292 will use proper signage and guard structures when stringing wire across roads and
293 railroads. The Transmission Facility will also be equipped with protective devices to
294 safeguard the public if a line or pole falls. Proper signage will also be posted.
295 Additional detail is provided in Sections 11.1 and 11.2 of the Application.
296

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.
309

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

316
317 In addition, Crocker is coordinating to determine the potential for inductive
318 interference on copper telephone lines owned by Interstate Telecommunications
319 Cooperative (“ITC”) in the Project area. Crocker will enter into an agreement with
320 ITC to ensure any interference will be mitigated prior to construction.

321
322 Additional information is provided in Section 9.5.7 of the Application.

323

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

325 A. Yes. The Project will utilize the One-Call program to locate underground
326 infrastructure prior to construction. In addition, once construction is completed, the
327 Project will register its facilities with the One-Call program.

328

329 **Q. With respect to use of existing local roads as haul roads, will Crocker
330 coordinate with local road authorities regarding the use and restoration of
331 those roads?**

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

338

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

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

345

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

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

353

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.

363

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

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

370

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.

405

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.

414

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

416 A. Crocker will be responsible for covering all anticipated decommissioning costs.

417

418 **VIII. CONCLUSION**

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420 **Q. Does this conclude your Direct Testimony?**

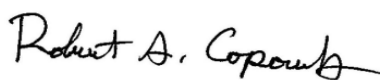
421 A. Yes.

422

423 Dated this 15th day of December, 2017

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426 

427

428 Rob Copouls