BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION OF WILD SPRINGS SOLAR, LLC FOR AN ENERGY FACILITY PERMIT FOR THE WILD SPRINGS SOLAR PROJECT

SD PUC DOCKET EL 20-___

DIRECT TESTIMONY OF MICHAEL MORRIS
ON BEHALF OF WILD SPRINGS SOLAR, LLC

May 15, 2020

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name, employer, and business address.

A. My name is Michael Morris. I am the Senior Director, Energy Assessment and Project Planning at Geronimo Energy ("Geronimo"). My business address is 8400 Normandale Lake Boulevard, Suite 1200, Bloomington, Minnesota.

Q. Briefly describe your educational and professional background and duties.

A. I have a bachelor's degree (2006) in Meteorology and a master's degree (2008) in Meteorology from the University of Oklahoma.

I am a member of the American Meteorological Society and have been working in the renewable energy industry since 2008. I have been responsible for siting, design, and resource assessment activities for over 10,000 megawatts of projects in 14 states. My areas of expertise include atmospheric remote sensing, numerical modeling and statistical analysis of weather data. A copy of my curriculum vitae is provided as Exhibit A3-1.

Q. What is your role with respect to the Wild Springs Solar Project (the "Project")?

A. I am responsible for solar resource assessment of the Project site, Project design, and negotiating equipment supply contracts.

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your Direct Testimony?

A. The purpose of my testimony is to discuss the Project's design, including the various components of the facility and the Project's land requirements.

Q. What exhibits are attached to your Direct Testimony?

A. The following exhibit is attached to my Direct Testimony:

- Exhibit A3-1: Curriculum Vitae

Q. Please identify the sections of the Energy Facility Permit Application ("Application") that you are sponsoring.

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

- Section 4.2: Design
- Section 4.3: Information Concerning Transmission Facilities
- Section 4.4: Land Requirements
- Section 11.4: Applicant's Burden of Proof
- Section 12.0: Testimony and Exhibits
- Appendix B: Site Plan

III. PROJECT DESIGN

Q. Please describe the various Project components.

A. The Project will consist of:

- Solar panels;
- A tracking rack system;
- Inverter and transformer skids;
- Collection and communication lines;
- A Project substation;
- Access roads;
- Operations and maintenance ("O&M") building and parking lot; and
- Up to 3 weather stations.

Q. Please describe the design of the solar panels.

A. The Project will use solar photovoltaic ("PV") panels with tempered glass approximately 4 to 7 feet long by 2 to 4 feet wide and 1 to 2 inches thick. To limit reflection, solar PV panels are constructed of dark, light-absorbing materials. Today's panels reflect as little as two percent of the incoming sunlight depending on the angle of the sun and assuming use of anti-reflective coatings, which will

be included on the panels used for the Project. The panels will include heat strengthened front glass and laminate material encapsulation for weather protection.

Q. What is the purpose and design of the tracking rack system?

The solar PV panels will be mounted on a tracking rack system, which allows the PV panels to track the solar resource throughout the day. The panels and tracking rack system are generally aligned in rows north and south with the PV panels facing east toward the rising sun in the morning, parallel to the ground during mid-day, and then west toward the setting sun in the afternoon. The panels are rotated by a small motor connected to the tracking rack system to slowly track with the sun throughout the day. The tracking rack system allows the Project to optimize the angle of the panels in relation to the sun throughout the day thereby maximizing production of electricity and the capacity value of the Project.

The tracking rack system is mounted on top of steel piers that are typically driven into the ground, without the need for excavation or concrete. Piers are typically installed at eight to fifteen feet below the surface. Geotechnical borings will be conducted prior to construction to determine site-specific conditions, which will factor into the final design. Examples of panels installed on the tracking rack system are shown in Section 4.2.1 of the Application. The panels and tracking rack system are constructed in blocks, known as arrays.

Q. Please describe the electrical collection system.

A. The electrical collection system consists of two main parts: cables that deliver direct current ("DC") power to the inverter/transformer skids, and cables that deliver alternating current ("AC") power from the inverter/transformer skids to the Project substation. The DC portion of the electrical collection system may be installed below-ground or may consist of a hybrid of above-ground/below-ground cables, depending on the geotechnical analysis, constructability, costs, and

availability of materials. If installed below-ground, the cabling from the panels to the inverters would be located in a trench approximately 4 feet deep and 1-2 feet wide. If installed using the hybrid method, the electrical collection system would be strung under each row of panels on steel arms and a steel cable attached to the piles. At the end of each row, hanging brackets would connect several racks/rows of cables to a common collection point near their assigned inverter/transformer skid where the cables will be routed below-ground at a minimum depth of at least 4 feet below grade to the inverter/transformer skid. In either scenario, the AC portion of the collection system would be installed below-ground.

Q. Please describe the purpose and design of the inverter and transformer skids.

A. The inverters convert the power from DC to AC and the transformers step the AC power up to 34.5 kilovolt ("kV"). The inverters, transformers, and Supervisory Control and Data Acquisition ("SCADA") system are co-located on skids, which are placed on top of a concrete slab or pier foundation and typically measure 10 feet wide by 25 feet long with a structure height of approximately 12 feet. The final number of inverter/transformer skids for the Project will depend on the specifications of the inverter selected, but 89 inverter/transformer skids are proposed in the Project's preliminary design. From the transformer, the AC power is transmitted to the Project substation via collection lines, as discussed above.

Q. Please describe the other Project components.

A. The Project will also include a Project substation, a less than one-mile-long 115 kV transmission line extending from the Project substation to the New Underwood Substation, an O&M building with adjacent parking lot, up to three weather stations up to approximately 20 feet in height, access roads, and perimeter fencing. Temporary laydown areas will also be used during Project construction.

Q. How will the Project interconnect to the grid?

A. The Project will interconnect to the grid via a less than one-mile-long 115 kV transmission line extending from the Project substation to the existing New Underwood Substation.

Q. What lighting will be used at the Project?

A. The Project will have pole-mounted, down-lit security lighting at the entrances, which will be both switch-controlled and motion activated. Additionally, there will be down-lit lights at each inverter, which will be switch controlled to allow repairs after dark.

Q. Based on the preliminary design, what are the estimated land requirements for the Project components?

A. As shown in Table 4.4-1 of the Application, the Project is estimated to occupy approximately 1,108.1 acres of the 1,499-acre Land Control Area. However, of those acres, only approximately 47.3 acres will be converted to land with impervious surfaces (i.e., the Project substation, O&M building, inverter/transformer skids, parking areas, and access roads). Other areas will be restored and revegetated, and the vegetation will be maintained throughout the life of the Project. *See* Section 4.4 of the Application.

IV. CONCLUSION

Q. Does this conclude your Direct Testimony?

A. Yes.

Dated this 15th day of May, 2020.

Michael Morris

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