BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF SOUTH DAKOTA

IN THE MATTER OF THE APPLICATION BY NORTHERN STATES POWER COMPANY, DOING BUSINESS AS XCEL ENERGY, AND OTTER TAIL POWER COMPANY FOR A FACILITY PERMIT FOR A 765 KV TRANSMISSION FACILITY AND ASSOCIATED FACILITIES IN GRANT, DEUEL, AND BROOKINGS COUNTIES, SOUTH DAKOTA

SD PUC DOCKET _____

PRE-FILED DIRECT TESTIMONY OF BENJAMIN GALLAY
ON BEHALF OF NORTHERN STATES POWER COMPANY, DOING BUSINESS AS XCEL ENERGY, AND OTTER TAIL POWER COMPANY

September 4, 2026

I. INTRODUCTION AND QUALIFICATIONS

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

A. My name is Benjamin Gallay. I am employed by Northern States Power Company, doing business as Xcel Energy (Xcel Energy). My business address is 414 Nicollet Mall, Minneapolis, Minnesota.

Q. What is your position with Xcel Energy?

A. I am employed as a Principal Engineer.

Q. Briefly describe your educational and professional background.

A. I received a Bachelor of Science degree in Electrical Engineering from the University of North Dakota in 2001. From 2001 until 2007, I was employed by NEI Electric Power Engineering, Inc. in Denver as an Electrical Engineer. Since 2007, I have been employed by Xcel Energy as a Transmission Engineer. My job responsibilities include designing all aspects of high voltage power lines and associated equipment. Additionally, I provide support on electrical concerns with transmission lines, grounding, radio interference, electric and magnetic fields (EMF), and conductor and equipment capacity. My statement of qualifications is attached as **Schedule 1**.

Q. What is your role with respect to the PowerOn Midwest-Big Stone South to Brookings County to South Dakota/Minnesota Border Project (Project)?

A. My role on the Project is to provide preliminary transmission line engineering support during the routing and permitting phases with particular emphasis on the electrical effects such as conductor selection (thermal and electrical capacity), corona, audible noise, radio interference, electrical losses, insulation coordination, grounding design, lightning protection, EMF considerations, induction (pipelines, railroads, fences, building, vehicles, etc.), electrical clearances (NESC), communication paths (OPGW).

II. PURPOSE OF TESTIMONY

Q. What is the purpose of your Direct Testimony?

A. The purpose of my Direct Testimony is to:

- Discuss noise related to the Project; and
- Discuss EMF related to the Project.

Q. What schedules are attached to your Direct Testimony?

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

- **Schedule 1:** Statement of Qualifications.

Q. Please identify which sections of the Application you are sponsoring for the record.

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

- Section 15.3: Noise
- Section 15.5: Satellite, cellular, radio, TV, and GPS reception
- Section 25.2: Electric and Magnetic Fields
- Appendix I: Communications Systems Interference Analysis.

III. NOISE

Q. What causes transmission lines to make noise?

A. Corona discharges create sound on transmission lines. Corona discharges are created when air surrounding transmission lines ionizes. The ionization is most likely to occur during periods of humid, wet weather.

Q. How did Applicants take corona noise into consideration when designing the Project's transmission lines?

A. Applicants designed the Project to ensure that transmission line noise would be no greater than 50 A-weighted decibels (dBA) L50 at the edge of the right-of-way regardless of the surrounding land. L50 is the level that will not be exceeded more than 50 percent of the time.

Q. Did Applicants run calculations to ensure this design criterion was met?

A. Yes. Applicants modeled the expected sound levels. The modeling showed a 44.8 dBA L50 for the 765 kilovolt (kV) line and 40.9 dBA L50 for the 345 kV line at the edge of the proposed rights-of-way. This led the Applicants to use a six bundled conductor and contributed to the 250-foot right-of-way for the 765 kV line. Additional detail is provided in Section 15.3 of the Application.

Q. How close is the nearest residence to the transmission line centerline?

A. All residences are at least 500 feet away from the transmission line centerline.

Q. What is the predicted sound level at 500 feet from the transmission line centerline?

A. Assuming no obstructions to dampen the sound as it travels, I would expect about 40 dB at 500 feet from the line outside the residence. Inside the residence I would expect the sound level to be approximately 20 dB.

Q. How does 44.8 dBA L50 compare to common noise sources?

A. This level at the edge of the right-of-way compares to a dishwasher in another room of a house.

Q. Will the Project also be designed so that sound at the edge of the substation properties do not exceed 50 dBA L50?

A. Yes. The Applicants will secure equipment and develop a substation layout that ensures the sound level does not exceed 50 dBA L50 at the edge of the substation property owned by the utility.

IV. ELECTRIC AND MAGNETIC FIELDS CALCULATIONS

Q. What are EMFs?

A. EMFs refers to electric and magnetic fields. EMFs are invisible forces that are associated with electricity. Electric field levels result from the electric charge or the voltage on a

conductor. Magnetic fields are created by current flowing through the lines. In the context of transmission lines, EMF typically refers solely to magnetic fields. Additional information is provided in Section 25.2 of the Application. In my testimony, I will speak to electric fields and magnetic fields separately.

Q. What is your role with respect to EMFs and the Project?

A. I am the subject matter expert sponsoring the calculations for EMFs and calculations contained in the Application and the effects of EMFs.

V. ELECTRIC AND MAGNETIC FIELDS EFFECTS

Q. What effects are typically associated with transmission line EMFs?

A. Typical effects are potential interference with communications devices, induced voltage and stray voltage.

Q. Will EMF interfere with communication devices such as radio, television, and Global Positioning System (GPS)?

A. Interference is unlikely to occur due to EMF and where interference does occur, there are mitigation methods available. While the occurrence is rare, physical obstructions such as towers can temporarily block or reflect satellite signals, causing localized inaccuracies. This is similar to how trees or buildings can reduce GPS accuracy. If the structure or conductor bundle temporarily obstructs the line of sight to one or two satellites, a receiver needing multiple satellites for a fix may experience brief interference errors as it passes by the obstructing objects.

Q. Can you provide additional detail regarding GPS and whether a high voltage transmission line like the Project may impact the functionality of GPS?

A. GPS and Global Navigation Satellite System (GNSS) receivers operate in microwave frequency bands within the gigahertz (GHz) range, which is significantly higher than the frequencies associated with EMFs generated by overhead transmission lines. As a result, transmission lines, including high-voltage facilities, are generally not expected to interfere

directly with GPS signals. While high-voltage lines can produce localized radio-frequency activity through corona or electrical discharge under certain conditions, research has consistently shown that this activity occurs at frequencies well below those used by GPS and GNSS systems.

Modern GPS and GNSS equipment has been demonstrated to maintain accurate positioning and reliable operation when used near or directly beneath high-voltage transmission lines. Although temporary reductions in signal quality, carrier-to-noise ratios, or real-time positioning performance may occasionally occur in the immediate vicinity of transmission facilities, these effects are generally minor and short-lived. In many cases, reported GPS issues are ultimately linked to factors unrelated to transmission lines, such as satellite anomalies, receiver configuration, equipment age, or communication-link interruptions used by real-time correction services.

Q. What is induced voltage?

A. Induced voltage occurs when an electric field comes in contact with a conductive object such as a vehicle or metal fence—the electric field is transferred to that object. If a person touches the object, they could experience a shock.

Q. Is the type of nuisance shock that may occur with the 765 kV line different than other transmission lines operated by Xcel Energy?

A. No. Our transmission lines are designed to meet the National Electric Safety Code requirement that limits the steady-state electrostatic effects from a transmission line electric field at five milliamperes if the largest vehicle under the line were short-circuited to ground. As a result, the potential electrostatic shock for the proposed 345 kV line and the 765 kV line are the same.

Q. How is induced voltage addressed?

A. Induced voltage can be addressed through proper grounding of fences and other metal objects.

Q. What is stray voltage?

A. Stray voltage is the difference in voltage between two conductive objects that may be contacted by people or animals. Stray voltage is typically caused by the lower voltage distribution system serving a customer or the customer's equipment, not by a high-voltage transmission line like the Project. If customers are experiencing issues with stray voltage, we encourage them to contact their local distribution provider.

Q. Can a transmission line cause stray voltage?

A. Although rare, because a transmission line can induce voltage on objects parallel and immediately under the transmission line such as a local distribution circuit, it is possible for the existing stray voltage issues to be impacted by the addition of a transmission line to the area.

Q. How is the Project addressing induced voltage?

A. The Project will be constructed in a manner to mitigate stray voltage by coordination with existing distribution service providers.

Q. Will the clearances be sufficient for farming activities to continue in the rights-of-way for the transmission line?

A. Yes. The Applicants also will comply with the National Electric Safety Code with respect to grounding objects and fences within the right-of-way. Farm equipment, passenger vehicles, and trucks will be able to be safely used under and near the transmission lines.

Q. Does this conclude your Direct Testimony?

A. Yes.

Dated this 4th day of September, 2026.

/s/ Benjamin Gallay

Benjamin Gallay