State of Minnesota
Court of Administrative Hearings

For the Public Utilities Commission

In the Matter of the Application for a Certificate of Need for the PowerOn Midwest 765 kV and 345 kV High Voltage Transmission Line Project

MPUC Docket No. E002, ET2, ET6675/CN-25-117

CAH Docket No.: 28-2500-41617

Direct Testimony of Benjamin Gallay

August 13, 2026

I. INTRODUCTION AND QUALIFICATIONS

Q. Please state your name and business address.

A. My name is Benjamin Gallay. My business address is 414 Nicollet Mall, Minneapolis, Minnesota 55401.

Q. By whom are you employed and in what capacity?

A. I am employed as a Principal Engineer by Xcel Energy Services Inc., the service company for Xcel Energy Inc. (Xcel Energy).

Q. Please briefly describe your educational background and professional experience.

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 (EMFs), and conductor and equipment capacity.

Q. What are your responsibilities as a Principal Engineer at Xcel Energy?

A. I am a member of the Xcel Energy Conceptual Design and Planning team responsible for development of project design scope, cost, and schedule for transmission projects, starting from project inception through to initial project execution.

Q. For whom are you testifying?

A. I am testifying on behalf of Great River Energy, Northern States Power Company, doing business as Xcel Energy, and ITC Midwest LLC (collectively, Applicants), in support of their Joint Certificate of Need Application (Application) to the Minnesota Public Utilities Commission (Commission) for the PowerOn Midwest Project (Project).

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

A. I was part of the team that compiled the Application. I assisted with and am sponsoring the sections regarding transmission line sound and EMF which include the parts of Chapter 8 of the Application listed below and parts of Appendix C (Technical Diagrams). Due to the physics of how electricity functions, noise may be generated in some circumstances; interference with electromagnetic signals can occur; and EMFs are created around the conductors. Each of these operating characteristics is considered when designing the transmission line to prevent any significant impacts to its operation and to the overall environment.

II. TESTIMONY OVERVIEW

Q. How is your Direct Testimony organized?

A. My Direct Testimony is organized as follows:

- Section III: Corona and Noise
- Section IV: Electric and Magnetic Fields Calculations
- Section V: Electric and Magnetic Fields Effects
- Section VI: Safety

Q. What schedules are attached to your Direct Testimony?

A. The following schedules are attached to my Direct Testimony:

- **Schedule 1**: Statement of Qualifications

Q. Are you sponsoring any sections of the Application?

A. Yes, I am sponsoring the following sections and appendices of the Application:

- Section 8.1 – Overview
- Section 8.2 – Corona
- Section 8.2 - Noise
- Section 8.4 – Radio, Television, and GPS Interference

- Section 8.5 – Safety
- Section 8.6 – Electric and Magnetic Fields, as it concerns engineering
- Section 8.7 – Stray and Induced Voltage
- Section 8.8 – Farming Operations, Vehicle Use, and Metal Buildings Near Transmission Lines
- Appendix C.2 – 345 kV Transmission Line Typical Structure

III. CORONA AND 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) L_{50} at the edge of the right-of-way regardless of the surrounding land use to ensure compliance with Minnesota's noise requirements. In Minnesota, the maximum night-time limit in residential areas is 50 dBA L_{50}. In an agricultural area, the night-time noise limit is 75 dBA. The L_{50} level represents the level exceeded 50 percent of the time, or about 30 minutes in an hour. This led the Applicants to use a six bundled conductor and contributed to the 250-foot right-of-way for the 765 kilovolt (kV) line.

Q. Did Applicants run calculations to ensure this design criteria were met?

A. Yes. Applicants modeled the expected sound levels. The modeling showed a 48.9 dBA for the 765 kV line and 40 dBA for the 345 kV line at the edge of the proposed rights-of-way. The modeling assumptions used are conservative in that they assume environmental

conditions that produce the most noise and no obstructions between the source and the receptor.

Q. How does the L_{50} dBA level at the edge of the right-of-way demonstrate compliance with Minnesota's noise standards?

A. Measuring at the edge of the right-of-way is conservative because compliance with noise standards is measured at receptors (*i.e.*, homes), not at the edge of the right-of-way. Because homes will be outside of the right-of-way, and noise dissipates with distance, noise levels at those receptors will be even lower than at the edge of the right-of-way. Likewise, the Applicants designed the Project to comply with Minnesota's strictest noise standard (50 dBA L_{50}), even though that requirement does not apply in much of the Project area.

Q. How does 50 dBA L_{50} 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. How will the Applicants ensure compliance with Minnesota noise standards at substations?

A. The Applicants will secure equipment and develop a substation layout that ensures the sound level does not exceed 50 dBA 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. 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 contained in the Application and the effects of EMFs.

Q. Are you providing any testimony regarding magnetic fields and potential health effects?

A. No. Dr. Jeff Ellenbogen is providing testimony on magnetic fields and potential health effects.

Q. Please summarize the electric field calculations.

A. For the 765 kV line, the maximum electric field is 7.47 kV/m measured at one meter above ground. For the 345 kV line the maximum is 4.14 kV/m measured at one meter above ground.

Q. Please summarize the magnetic field calculations.

A. For the 765 kV line, the magnetic fields at the edge of the 250-foot right-of-way are 75.7 milligauss (mG). This level is comparable to the magnetic fields six inches from a copy machine (90 mG). For the 345 kV line, the magnetic fields at the edge of the 150-foot right-of-way are 45 mG. This level is comparable to the magnetic fields one foot away from a vacuum cleaner (60 mG).

V. ELECTRIC AND MAGNETIC FIELDS EFFECTS

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

A. EMF effects are typically related to interference with communication devices, stray voltage, and induced 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. 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 additional 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.

VI. SAFETY

Q. What safety considerations re Applicants incorporating into the design of the Project?

A. The Applicants are designing the Project, and the Project will be constructed in a manner to comply with all applicable local, state, and federal standards. These standards establish clearances, material strength, and operational capabilities. The transmission conductors will also be equipped with protective devices that will de-energize the line should there be an extreme weather event or if an accident causes the conductor to fall. The Applicants also will comply with the National Electric Safety Code with respect to grounding objects and fences within the right-of-way.

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

A. Yes. Farm equipment, passenger vehicles, and trucks will be able to be safely used under and near the proposed transmission lines.

VII. CONCLUSION

Q. Does this conclude your Direct Testimony?

A. Yes.

BENJAMIN J. GALLAY

EMPLOYMENT HISTORY

2007- Present	**Xcel Energy, Minneapolis, MN** Principal Engineer (2018-Present) Senior Engineer [CMT] (2010-2018) Transmission Engineer (2007 – 2010)
2001 - 2007	**NEI Electric Power Engineering, Inc., Denver, Colorado** Design Engineer

EDUCATION

2001	B.S. in Electrical Engineering, University of North Dakota, Grand Forks, ND
2002-2007	Masters level studies, Colorado School of Mines, Golden, CO

LICENSES, TRAINING & MEMBERSHIPS

- Professional Engineer – North Dakota, Michigan, Wisconsin, Minnesota, and Colorado
- Senior Member IEEE, (2000-Present)

WORK EXPERIENCE

I. **Xcel Energy** *Principal Engineer [Transmission] (2018-Present)*

Under general direction, demonstrates complete understanding & wide application of engineering technical principle, theories, & concepts in the field. Independently determines & develops approaches to solutions. Provides work direction to other professionals &/or staff. Represents the organization in providing solutions to difficult technical issues associated with specific projects. Frequent inter-organizational & outside customer contact. Demonstrates a broad knowledge & proficiency of precedents in the specialty area, a good knowledge of related specialties, & general knowledge of other related disciplines.

- Standards & Technical Committee
  - Seated on 9 committees, 6 as chair or vice chair and a resource for called in for expertise and opinions on many other line and substation committees.
- T-line Material Team Lead
  - Generated an unofficial engineering and design team responsible for review and standardization of all t-line hardware across all regions.
- T-line engineering representative for Conductor and OPGW
  - Generated the past several and existing Supply Chain sourcing contracts for overhead conductor and OPGW
- T-line engineering representative for Legal Affairs
  - Since 2013 I have been the lead technical witness for the NSP region
    - Started as part of the CapX team, due to my success I have been requested to testify on a wide range of Xcel projects.
- T-line engineering representative for Construction Training
  - Since 2015 I have generated and presented engineering updates section of the annual lineman training for NSP.

II. **Xcel Energy** *Senior Engineer [Consultant Management Team] (2010-2018)*

The primary function of a staff engineer on the Engineering Outsourcing Consultant Management Team is as an internal supervisor of external contracted engineering personnel. CMT engineers monitor both the technical competence as well as the project efficiency and manage workload and team composition of external resources to ensure effective project design. On an annual basis I am responsible for the management of some 20+ active major projects with a crew of 40+ consultant engineering and design staff. In addition to this primary role on the CMT team I have continued to function as a subject matter expert for the internal Xcel transmission staff on technical topics as well as company policy and procedure creation, updates, and revisions. Highlights of this work are listed below:

- CMT T-line Engineering Development
    - Responsible for guiding the selection and development of high-quality consultant assets onto the 'Xcel Teams' within various consulting firms.
- Cap X 2020
    - Electrical Engineering team member for development of project design specifications.
    - Transmission line engineering team member for route permitting.
    - Engineering review resource for transmission line sections designed by external consultant engineering resources.
    - Primary expert witness for permitting and land acquisition hearings with state and county jurisdictions.
- Sioux Falls Loop
    - $42M project group including nine individual line construction project totaling $22.6M designed and constructed over a two-year period.
- Stone Lake to Radisson
    - $24M project group including six individual line construction project totaling $12M designed and constructed over a two-year period.

III. **Xcel Energy** *Transmission Engineer (2007-2010)*

All projects while working with Xcel Energy have required extensive project coordination and management of budget, schedule, and materials on a weekly basis. Highlights of these responsibilities are listed below.

- Hiawatha Project – Engineering support of project permitting and routing
    - 115kV Transmission line cost estimate both overhead and underground options
    - Responsible for transmission line engineering and construction sections of the route and permit applications
    - Direct testimony at route application hearings.
        - Line Design.
        - Line Construction.
        - Line Cost Estimates.
        - Line EMF calculations and impacts.
- Transmission Environmental Planning (TEP) Working Group
    - Transmission Engineering Representative.
    - Trapezoidal wire evaluation team lead.
- Transmission Line Switch Replacements
    - Transmission Line Switch Subject Mater Expert (SME)
    - Over 15 transmission line switch replacement projects, 69-115kV
- 500kV Insulator Replacement – Line(s) 5702 and 5703 polymer insulator replacement.
- Transmission Line EMF calculations, mitigation design, and public relations.
    - Primary Resource for transmission line EMF calculations.

    - Resource for EMF testimony for state and local route applications.
    - Resource for news media information requests.
    - Resource for landowner information requests.
- Transmission Line Engineering Policy and Procedure coordinator
- Engineering review of line refurbishment projects and material ordering.
- Engineering review of line relocation projects and material ordering.

IV. **NEI Electric Power Engineering, Inc.** *Electrical Engineer (2001 – 2007)*

Work with NEI had particular focus on protective relay setting development and fault analysis. My focus 2005-2007 being in the SCADA and HMI controls aspect as well as field investigation of fault incidents.