

STATE OF MINNESOTA  
OFFICE OF ADMINISTRATIVE HEARINGS  
FOR THE  
MINNESOTA PUBLIC UTILITIES COMMISSION

In the Matter of the Application of Great  
River Energy, Northern States Power  
Company (d/b/a Xcel Energy) and  
others for Certificates of Need for  
Three 345 kV Transmission Lines

FINDINGS OF FACT,  
CONCLUSIONS AND  
RECOMMENDATIONS

[EXCERPT -- verbatim except that citations to record are omitted]

Electric and Magnetic Fields

398. Electric and magnetic fields (EMF) are present around any electrical device. Electric fields are the result of voltage or electrical charges, and the intensity of the electric fields are related to the operating voltage of the line or the device. EMFs are the result of the flow of electricity or current that travels along transmission lines, distribution lines, substation transformers, house wiring and household electrical appliances. The intensity of a magnetic field is related to the current flow through the wires.

399. There has been a great deal of research conducted to determine whether exposure to power-line-level EMF causes biological exposure and health risks. The issue has been addressed in several prior proceedings before the Commission, and has not been of sufficient concern to prevent construction of new transmission lines. Neither the state nor federal government has established limits on exposure to magnetic fields.

400. Several members of the public expressed their concern about the health effects of the transmission lines, including the possible links to cancer.<sup>468</sup> Joe Kenning spoke of the adverse effects a nearby line has had on his family's personal health and on his livestock. Robert Dahse has worked in the renewable energy field for many years. He cited studies linking EMF exposure to adverse health effects. Jan Rohwer of Greenvale Township expressed concern about the cancer deaths in her family.

401. Because of the continued uncertainty and public concern, the Minnesota Department of Health recommends a "prudent avoidance" policy to minimize Exposure.

402. Transmission lines can induce "stray voltage" when an electric distribution line runs parallel or under a transmission line. If not properly grounded, the

voltage on the line may move to the ground through an object that comes in contact with it. The Applicants have committed to taking appropriate measures to prevent stray voltage problems when the transmission lines parallel or cross distribution lines.

403. The ER discussed the general effect of new transmission lines on noise, radio and television interference, and human health and safety, including exposure to electric and magnetic fields and stray voltage. It concluded that proper placement and installation of the lines should protect the public.

404. The ER commented specifically on the World Health Organization's recent review of the health implications of electromagnetic fields, and, in particular, the possible link between exposure and incidence of childhood leukemia. Although the WHO could not conclude that there was a causal link, there is still troubling evidence of increased risk of childhood leukemia associated with average exposure to residential power-frequency magnetic field of about 0.3 to 0.4 micro Teslas (0.03 to 0.04 milliGauss). This average exposure range is several times less exposure than the "Peak Magnetic Field at ROW Edge," in milliGauss (mG), expected for the three projects. The estimated "Peak Magnetic Field at [right-of-way] Edge" is estimated to range from 0.4 mG to 92 mG, and the largest number of estimates for the various components of the projects clustered between 15 and 30 mG.<sup>477</sup> The record is unclear about the distance from the proposed projects that would be required to reduce the exposure level below 0.3 to 0.4 micro Teslas.

405. The ER pointed out that there are many sources of exposure to magnetic fields, including household appliances and computers, although it is difficult to compare the typical length of exposure.

406. Many members of the public expressed concern about the lack of definitive evidence that exposure to transmission lines is safe, including some who have felt the effects of nearby lines or stray voltage, and requested extra precautions.

407. In light of the on-going concern about the possible effects of the transmission projects, members of public recommended use of the "precautionary principle," routing the transmission lines to avoid human exposure and minimize the possible health impact. Members of the public offered suggestions to mitigate EMF, including wider easements, additional technology to sheathe power lines, and elimination of the higher voltage lines.