



## STATE OF MINNESOTA PUBLIC UTILITIES COMMISSION

Rec'd Elec. 7/25/05

July 8, 2005

Ron Spangler Jr  
Otter Tail Power Company  
POB 496  
215 S Cascade St  
Fergus Falls MN 56538-0496

Mr. Spangler:

Commission staff has reviewed the Hendricks Golf Course situation and provides the following in response.

*Background Information*

Otter Tail Power Company (OTP) serves the town of Hendricks, Minnesota, located on the southwest Minnesota border. Several South Dakota residents located directly across the border from Hendricks have filed a complaint with the South Dakota Commission regarding voltage sags due to the Hendricks golf course's irrigation equipment.

OTP ran a power quality analysis at both the golf course and residences in question. The voltage charts clearly indicate numerous voltage sags that coincide with the golf course's irrigation periods. The voltage sags vary slightly below a Category A minimum service voltage of 114 volts (110 to 113 volts). The voltage sags are frequent enough to fall under IEEE standard 141-1993 on voltage flicker which states 10 volt dips per hour exceeding 3% meets the definition of "irritation."

*Solutions*

OTP has offered two solutions to the golf course:

1. The golf course pays OTP to bring a third phase (one mile of construction) from an upstream feeder to change the three phase bank from open delta to closed delta. This would eliminate the magnitude of the dips and/or serve the residential customers from the new circuit, isolating them from the golf course.
2. The golf course pays to convert its 15 hp and 25 hp motors to soft-start.

*PUC Analysis*

Hendricks is served by a distribution system rated at 2400 volt delta. While this system was the standard at the time of installation, nearly all such systems have been converted to 15kV systems to meet increasing load levels. In a 15kV system, a 100 hp motor start would rarely cause voltage flicker.

Staff believes the current 2400 volt system can no longer provide adequate service to OTP's customers in this area. Staff recommends one of the following alternatives:

1. OTP upgrades from 2400 volt to 15kV distribution system.
2. OTP continues using current 2400 volt system and OTP covers the cost to bring in third phase to isolate customers.
3. OTP continues using current 2400 volt system and OTP covers the cost for golf course's soft-start motor upgrade.

Please respond by July 20, 2005 to advise what action Otter Tail will take to address the problems identified and a timeline for resolution.

Sincerely,



Al Bierbaum  
Engineer

cc: Janet Gonzalez, Energy Unit Manager  
Minnesota Public Utilities Commission

Tracy Smetana, Consumer Affairs Office  
Minnesota Public Utilities Commission