Twin Cities Minnesota
Zone Meeting
Xcel Energy

May 11, 2005
Bloomington, MN
Overview of Presentation

• Xcel Energy Projects:
  – Aldrich to St Louis Park 115 kV line
  – Eden Prairie to Edina 115 kV line
  – Eden Prairie - Minnetonka Area
  – Carver County - Waconia Area
  – Chisago to Apple River Project
  – High Bridge to Rogers Lake 115 kV line
  – Blue Lake generation outlet
Overview of Presentation

- New Koch to Inver Hills 115 kV line line #2
- Prairie Island to Red Rock 345 kV circuit #2
- Oakdale to Tanners Lake 115 kV line
- Champlin to Champlin Tap to Crooked Lake 115 kV
- New Yankee Doodle 115 kV source
- Twin Cities 345/115 kV transformer capacity
- Twin Cities Fault current issue
Aldrich-St Louis Park 115 kV
Aldrich-St Louis Park 115 kV Line

• **Need:**
  – Under some summer peak conditions, the line may overload
  – Worst case outage of the 345 kV double circuit carrying the Parkers Lake-Dickinson line and the Parkers Lake Elm Creek line;

• **Solution:**
  – Re-conductor the line by summer 2006 to enable it to carry more power
Edina-Eden Prairie 115 kV Line
Edina-Eden Prairie 115 kV Line

• **Need:**
  – Under some summer peak conditions, a one mile section of this line may overload
  – Outage of the double circuit carrying the Parkers Lake-Cedar Lake and Parkers Lake-Bassett Creek 115 kV lines

• **Proposed Solution:**
  – Upgrade line to 600 amps by reconductoring 4.7 miles of 795 ACSR with 795 ACSS
  – Upgrade switch at Edina substation to 3000 amps
Eden Prairie-Minnetonka Transmission System
Eden Prairie-Minnetonka Area

• Needs:
  – Outage of Scott County-Chaska 69 kV line overloads Excelsior-Westgate 69 kV line in 2006
  – Outage of Westgate-Eden Prairie 115 kV double circuit line results in low voltage in 2008
  – Outage of Scott County-Chaska 69 kV line overloads the reconductored Excelsior-Westgate 69 kV line in 2011
Eden Prairie – Minnetonka Area

• Short-term upgrades:
  – Reconductor Excelsior-Deephaven-Westgate 69 kV line and Westgate 115 kV capacitor
  – Expected in-service of 2006 (line) and 2008 (capacitor)

• Long-term upgrade:
  – Scott Co - Westgate 69 kV rebuild to 115 kV (approximately 2011)
  – Will be reviewed again in upcoming twin cities long range studies
Westgate to Scott County 115 kV line option

Westgate to Scott County 69 kV line rebuild to 115 kV (2011)
Option 1 - Rebuild to 115 kV from Glencoe to Carver County in 2008

Option 2 – Rebuild to 115 kV from Glencoe to West Waconia in 2008
Carver Co - Waconia Area

• **Needs:**
  – During summer peak load conditions, the Glencoe-Young America 69 kV line may overload by 2008
  – outage of future McLeod-Glencoe 115 kV line
Carver Co – Waconia Area

• Long-term upgrade options for 2008:
  – Rebuild Glencoe-Carver Co 69 kV line to 115 kV
  – Rebuild Glencoe to West Waconia 69 kV line and reconfigure 69 kV system to 115 kV
  – Expected to begin review studies by end of 2005
  – Plan to file CON Spring 2006
Chisago – Apple River Project

• **Needs:**
  – Outage of Apple River 69 kV source may result in overload of Arden Hills-Birch 69 kV line
  – Outage of Apple River 69 kV source may result in low voltage at Shafer, Scandia, and Sand Lake
  – Outage of Arden Hills 69 kV source may result in overload of Apple River-Garfield 69 kV line
  – Using operating procedures to defer upgrades into the later 2000’s.
Chisago – Apple River Project

• **Options examined:**
  – Chisago-Lawrence Creek 115 kV line and Lawrence Creek-Apple River 161 kV line. Recommended plan
  – Chisago-Apple River 69 kV line rebuild
  – Reconfigure 69 kV system and add reactive support
  – Distributed generation is cost prohibited

• **Update:** Project approved in Wisconsin. Certificate Of Need still needs to be filed in Minnesota
Chisago Co-Lawrence Creek 115 kV line
Lawrence Creek-Apple River 161 kV line
New Lawrence Creek substation
Rebuild Chisago-Apple River 69 kV line
New Lawrence Creek substation
High Bridge-Rogers Lake 115 kV Line
High Bridge-Rogers Lake 115kV Line

• **Need:**
  – This has the potential to overload under certain operating conditions
  – Operating procedure: generation redispachtch (being reviewed annually)

• **New Factor:**
  – High Bridge and Riverside generation are scheduled to be upgraded and converted from coal to gas/steam combined plants as part of the Metropolitan emission reduction program (MERP) in 2008-2009
  – High Bridge to Rogers Lake 115 kV line overload is aggravated by the MERP projects
High Bridge-Rogers Lake 115kV Line

• **Status:**
  - MISO is almost completed transmission service request studies for the High Bridge and Riverside generation upgrades
  - Found that High Bridge and Riverside generation
  - Upgrades cause overload of High Bridge to Rogers Lake 115 kV during certain transmission outages
Blue Lake Generation Increase Project

**Need:**
- Generation increase of about 395 MW at Xcel Energy’s Blue Lake Substation in Shakopee
- Plant is in-service
- Plant required additional transmission outlet

**Solution:**
- Interconnecting to the existing McLeod to Black Dog 230 kV
- Moved Black Dog 230/115 kV transformer Blue Lake
- Reconductor 8 miles of Blue Lake to Black Dog 230 kV and operate at 115 kV
Blue Lake generation increase project
New Koch to Inver Hills 115 kV #2

• **Need:**
  • Under summer peak conditions, existing Koch to Inver Hills 115 kV may overload for Outage of Black Dog to Riverwood 115 kV line

• **Solution:**
  • Build 2nd Inver Hills to Koch Refinery 115 kV along with substation equipment upgrades at Inver Hills and Koch Refinery substations
  • 2007 expected in-service date
New Koch to Inver Hills 115 kV #2
Prairie Island to Red Rock
345 kV circuit #2

Increase ground clearance of Red Rock to Prairie Island 345 kV circuit #2

High Voltage Transmission to South and East of Twin Cities Metro
Prairie Island to Red Rock 345 kV circuit #2 Uprate

• Need:
  • One of the two parallel 345 kV lines built to an older standard
  • Under some summer peak load conditions, this line may have insufficient ground clearance
  • Outage of the double circuit from Blue Lake to Prairie Island and parallel Prairie Island to Red Rock 345 kV line.

• Solution:
  • Increase the line clearance
  • Expected in-service of 2006
Oakdale to Tanners Lake 115 kV

• **Need:**
  - Under some Summer peak load conditions, the line may overload
  - Outage of Red Rock to Woodbury 115 kV line

• **Recommendation:**
  - Upgrade 5 mile Oakdale to Tanners Lake 115 kV
  - Expect final decision in early 2006
Oakdale to Tanners Lake 115 kV
Champlin to Champlin Tap
115 kV

• **Need:**
  - Under some Summer peak load conditions, the line may overload
  - Outage of the 345 kV double circuit Elm Creek to Parkers Lake line and the Sherburne County to Coon Creek 345 kV line

• **Recommendation:**
  - Upgrade capacity of 2.4 miles line in 2007
  - Expect final decision in early 2006
Champlin to Champlin Tap
115 kV
Champlin Tap to Crooked Lake 115 kV

• Need:
  • Under some Summer peak load conditions, the line may overload
  • Outage of Coon Creek to Parkwood 115 kV

• Recommendation:
  • Upgrade capacity of 2.4 miles line in 2008
  • Expect final decision in early 2006
Champlin Tap to Crooked Lake 115 kV
New Yankee Doodle 115 kV source project-Existing Yankee Doodle area
Yankee Doodle served by single 115 kV from Lone Oak

Normally open between lines

69 kV facilities

115 kV facilities
Twin Cities 345/115 kV Transformers
Twin Cities 345/115 kV Transformers

• **Needs Identified:**
  – Under some summer peak conditions
    • Eden Prairie 345/115 kV may overload for parallel transformer outage
    • Parkers Lake 345/115 kV may overload for parallel transformer outage
    • Red Rock 345/115 kV may overload for parallel transformer outage
    • May be aggravated by reduced Twin Cities metro 115 kV generation levels.
  • Twin Cities 10 year planning study expected to be initiated during 2005-2006.
Twin Cities Fault Current Issue

• Need identified:
  – General fault levels on the system are increasing as we add lines and generation
  – The grounding capability is limited to 50 kA. This is due to grounding equipment limitations
  – The next limiting equipment are the breakers that are nominally rated for 63 kA but have been de-rated to below 60 kA
  – Sectionalizing the system may be needed to decrease the fault current levels
  – Planning study is needed to identify alternatives
Any Questions/ Input?