

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

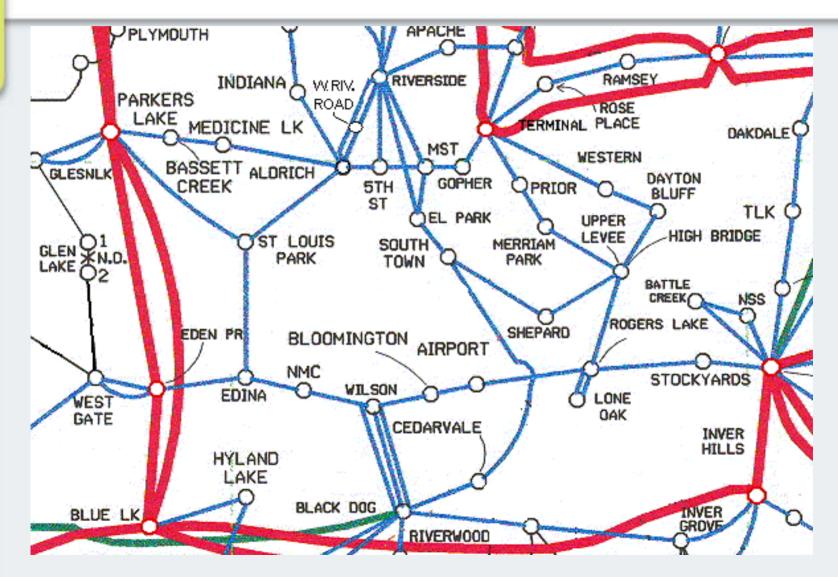


Overview of Presentation

- 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:

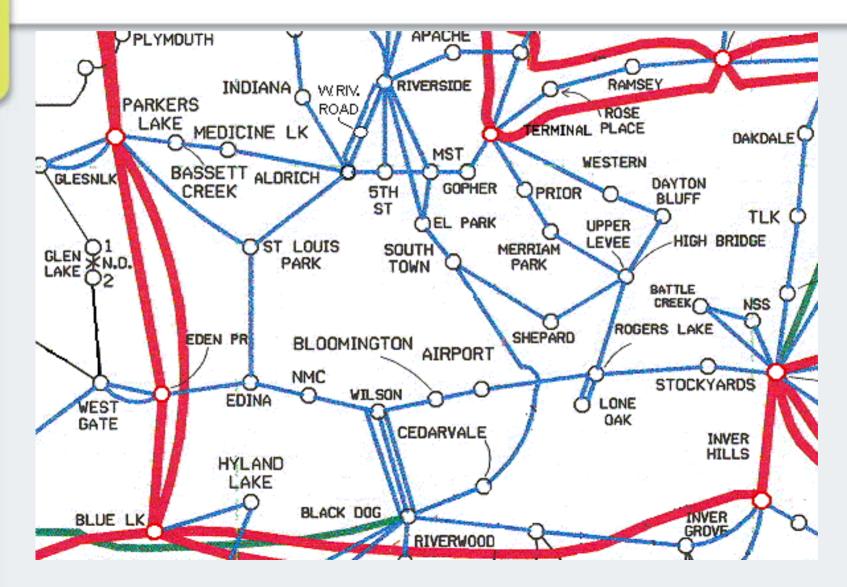
- Under some summer peak conditions, the line may overload
- Worst case outage of the 345 kV double circuit carrying the Parkers Lake-Dickinson line and the Parkers Lake Elm Creek line;

• 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

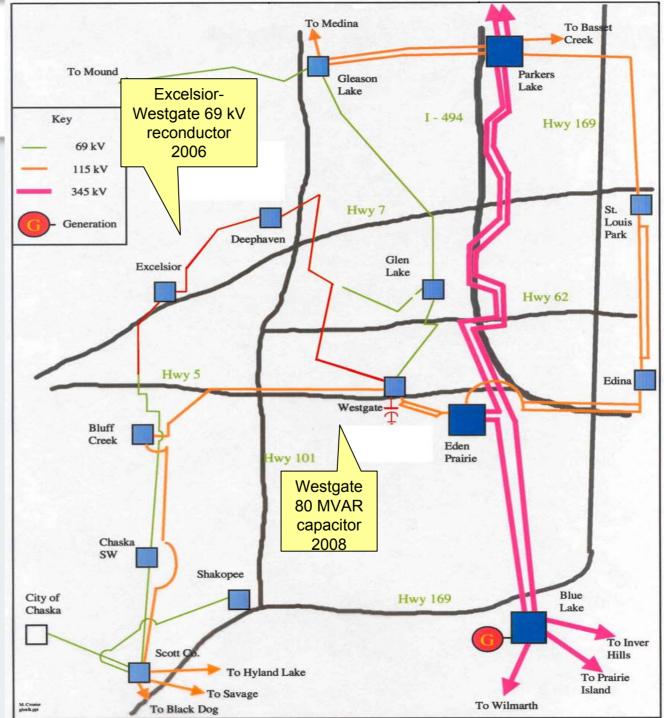
• Need:

- 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:

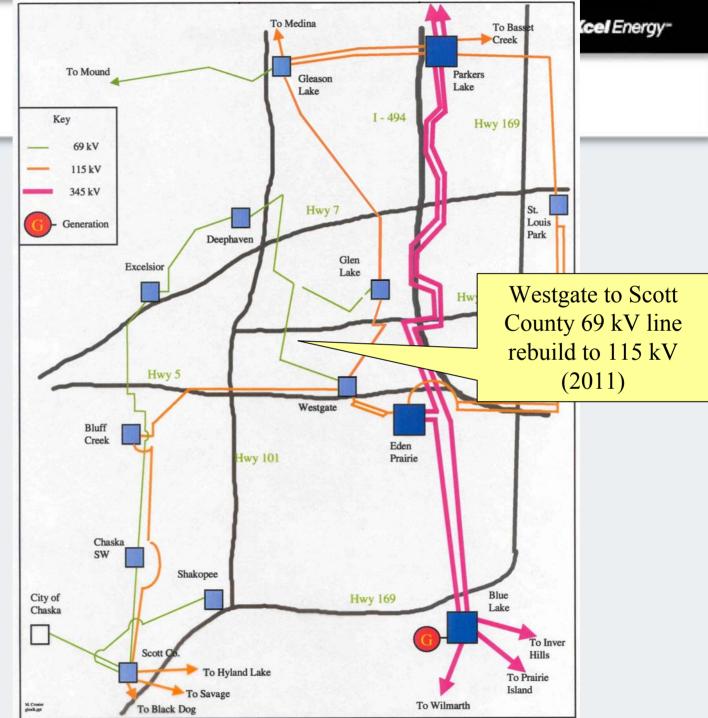
- Outage of Scott County-Chaska 69 kV line
 overloads Excelsior-Westgate 69 kV line in 2006
- Outage of Westgate-Eden Prairie 115 kV double circuit line results in low voltage in 2008
- Outage of Scott County-Chaska 69 kV line
 overloads the reconductored Excelsior-Westgate
 69 kV line in 2011



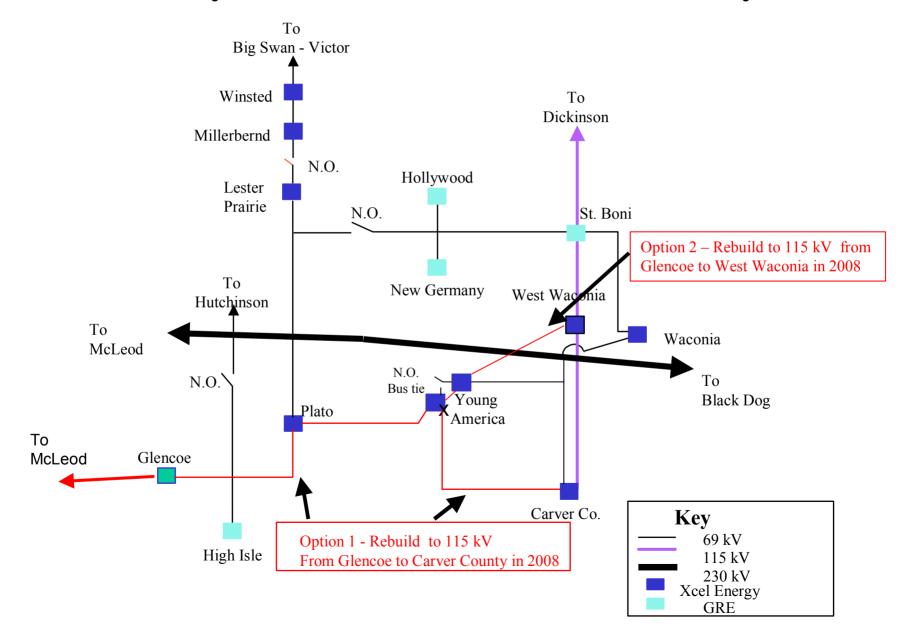
Eden Prairie – Minnetonka Area

- 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



Carver County - Waconia Area Transmission System





Carver Co - Waconia Area

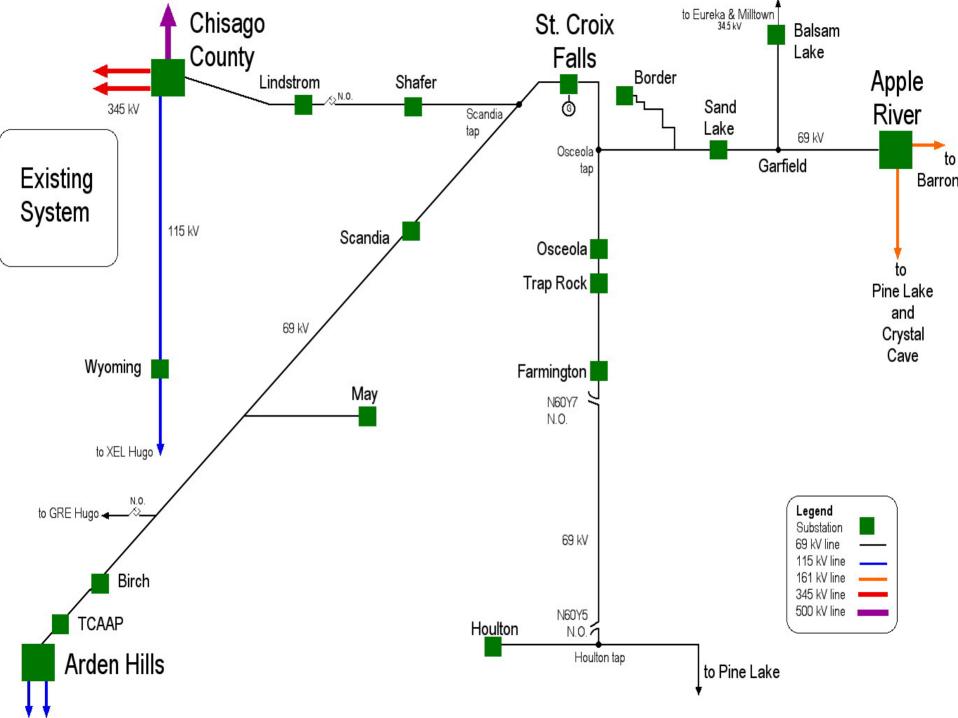
Needs:

- 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:

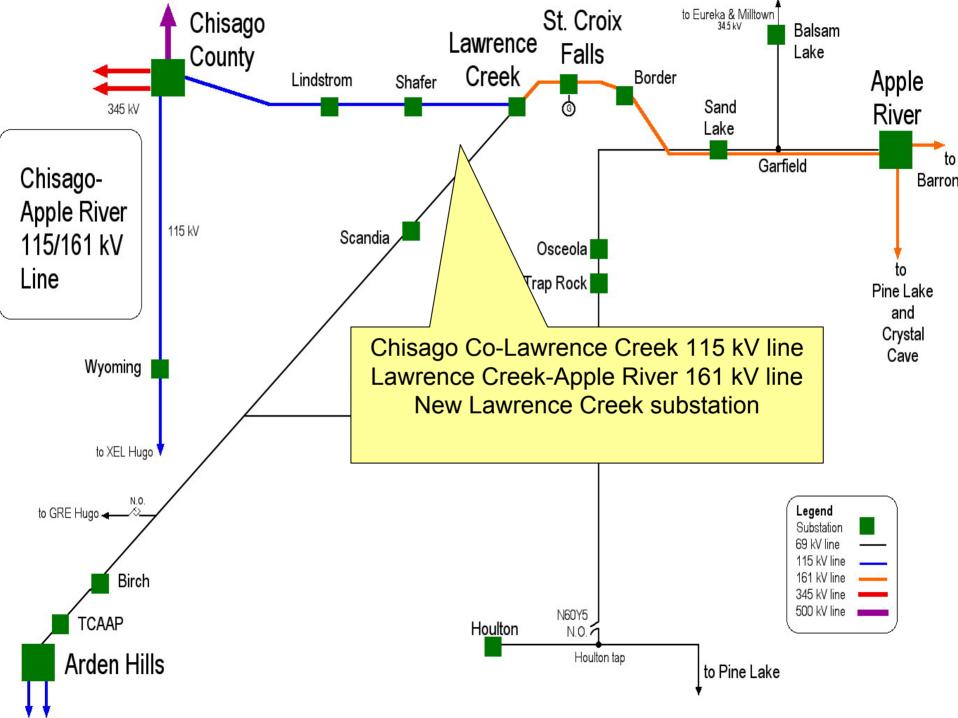
- Outage of Apple River 69 kV source may result in overload of Arden Hills-Birch 69 kV line
- Outage of Apple River 69 kV source may result in low voltage at Shafer, Scandia, and Sand Lake
- Outage of Arden Hills 69 kV source may result in overload of Apple River-Garfield 69 kV line
- Using operating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

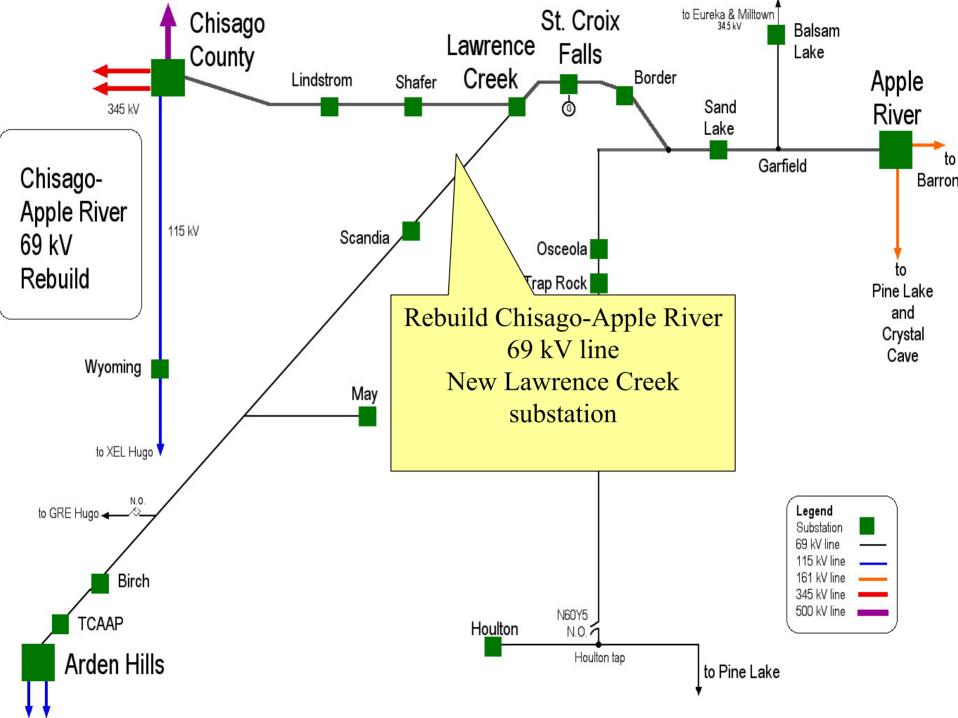


Chisago – Apple River Project

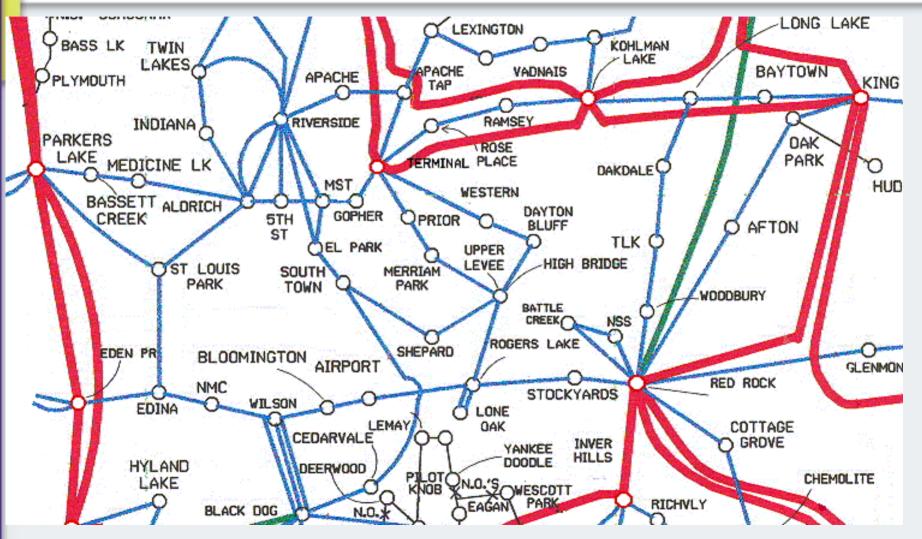
Options examined:

- 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





115 kV Line



Xcel Energy

High Bridge-Rogers Lake 115kV Line

· Need:

- This has the potential to overload under certain operating conditions
- Operating procedure: generation redispatch (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:

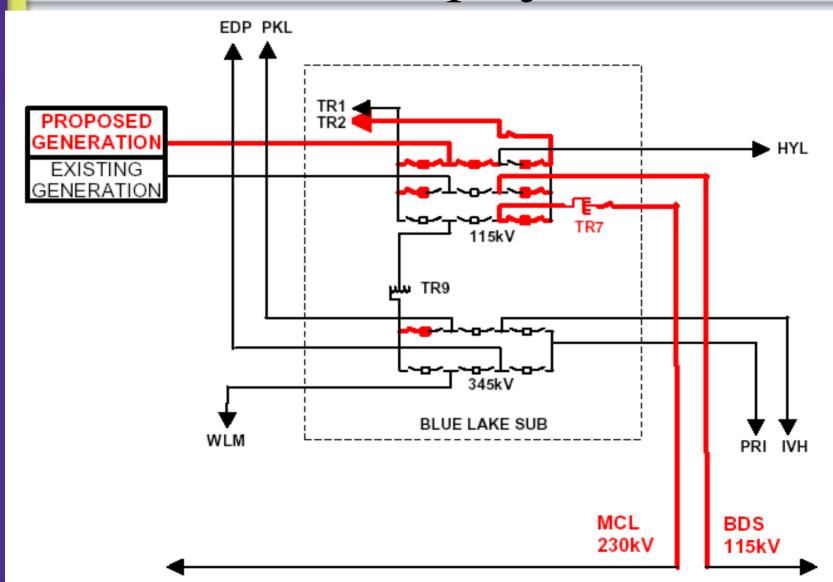
- Generation increase of about 395 MW at Xcel Energy's Blue Lake Substation in Shakopee
- Plant is in-service
- Plant required additional transmission outlet

• 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:

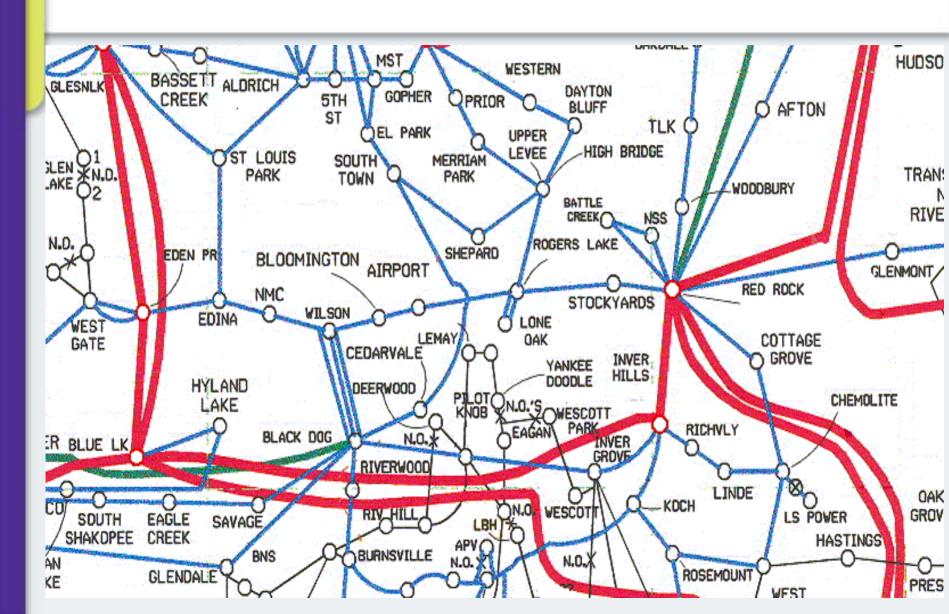
• Under summer peak conditions, existing Koch to Inver Hills 115 kV may overload for Outage of Black Dog to Riverwood 115 kV line

Solution:

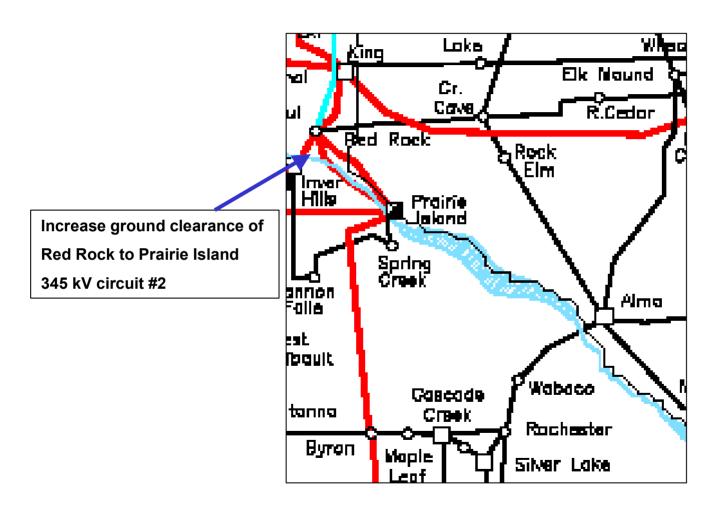
- Build 2nd Inver Hills to Koch Refinery 115 kV along with substation equipment upgrades at Inver Hills and Koch Refinery substations
- 2007 expected in-service date



New Koch to Inver Hills 115 kV #2



Prairie Island to Red Rock 345 kV circuit #2



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 build 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:

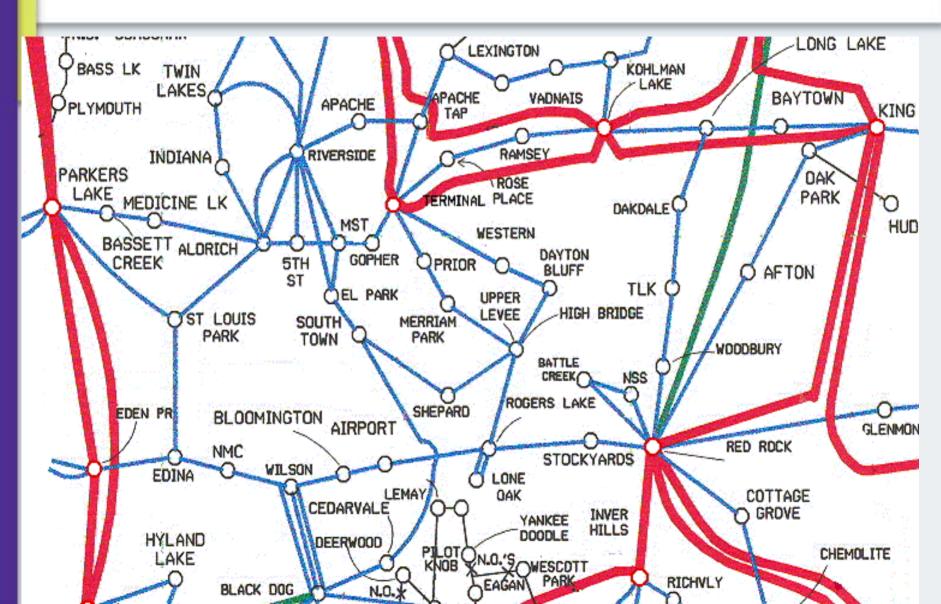
- Under some Summer peak load conditions, the line may overload
- Outage of Red Rock to Woodbury 115 kV line

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:

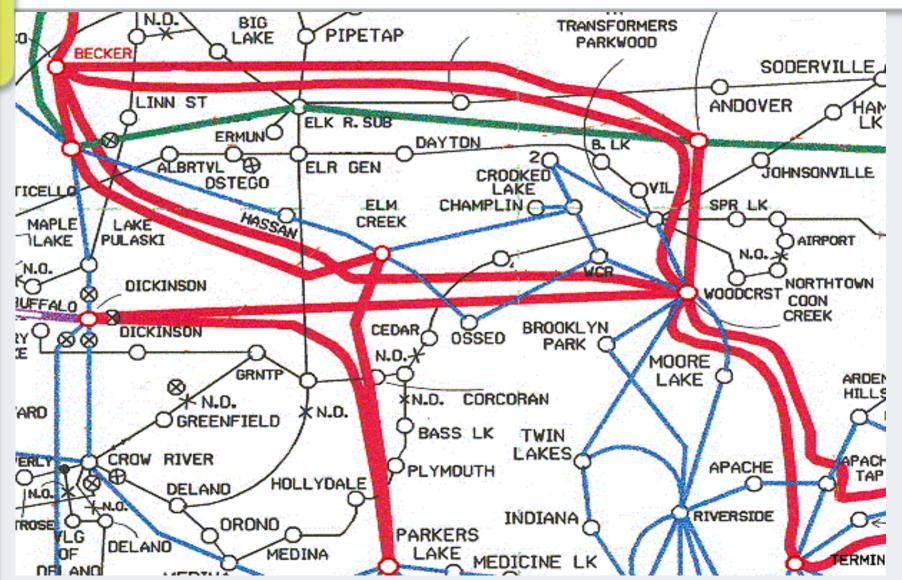
- Under some Summer peak load conditions, the line may overload
- Outage of the 345 kV double circuit Elm Creek to Parkers Lake line and the Sherburne County to Coon Creek 345 kV line

Recommendation:

- Upgrade capacity of 2.4 miles line in 2007
- Expect final decision in early 2006

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Champlin to Champlin Tap 115 kV



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Champlin Tap to Crooked Lake 115 kV

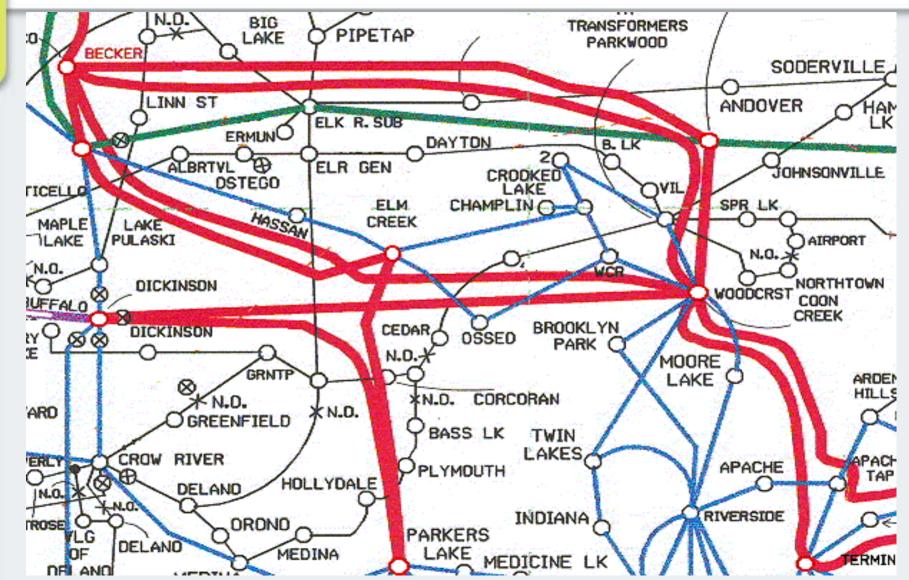
• Need:

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

Recommendation:

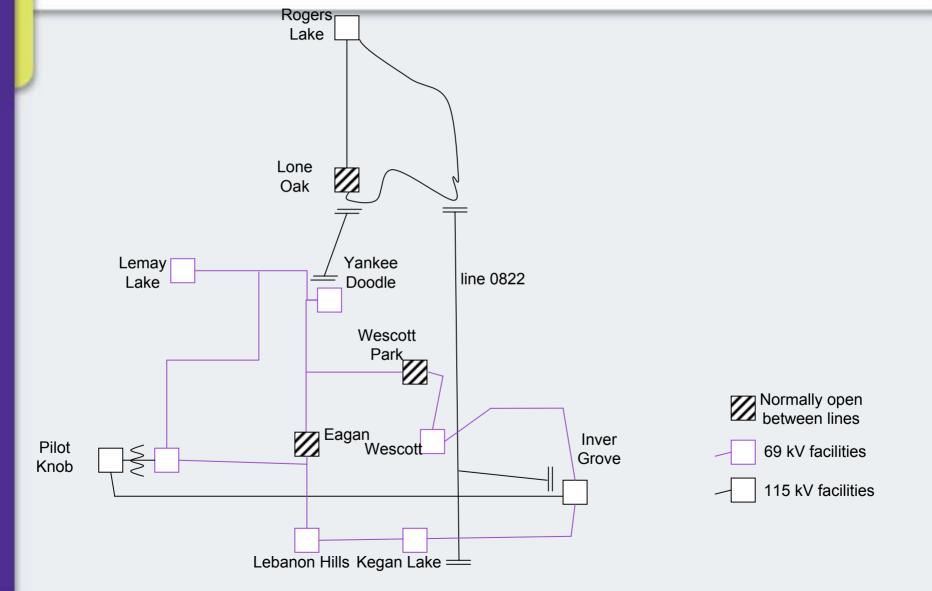
- Upgrade capacity of 2.4 miles line in 2008
- Expect final decision in early 2006

Lake 115 kV



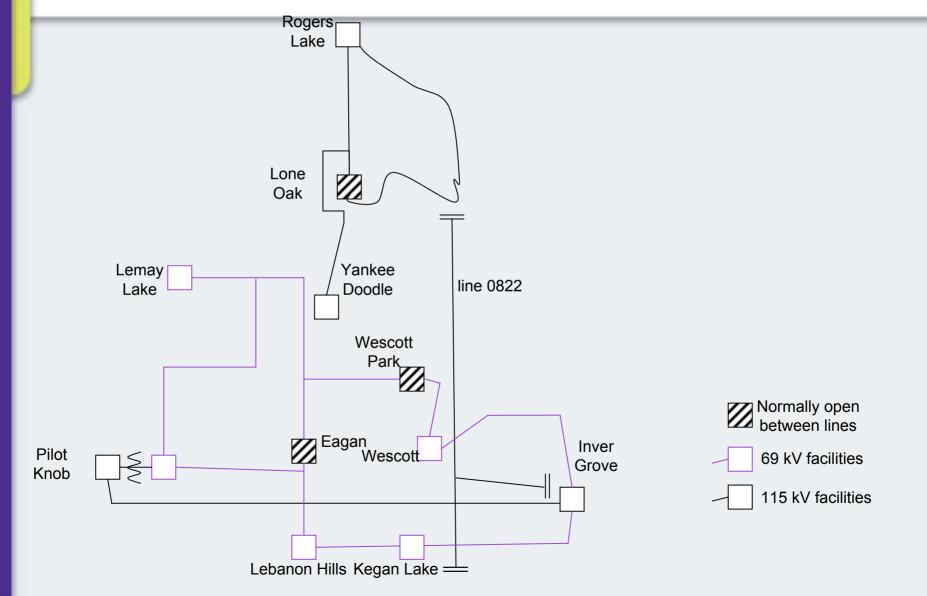


New Yankee Doodle 115 kV source project-Existing Yankee Doodle area





Yankee Doodle served by single 115 kV from Lone Oak



Xcel Energy* WEST END A BALDWIN ZISANTI CHISAGO AT ZIMMERMAN TRANSFORMERS BUNKER **COOPERS** MARTIN **PIPELINE** CORNER LAKE SHAFER BIG TRANSFORMERS PIPETAP PARKWOOD WYOMING. BECKER SODERVILLE FORESTO LAKE ANDOVER HAM ELK R. SUB ERMUNÓ BLAINE B. LK CROOKED LAKE ALBRTVL OSTEGO ELR GEN HUGO JOHNSONVILLE CHAMPLINO C-TAP CREEK MAPLE HUGO LAKE PULASKI TLAKE CIRCLE WOODCRST COON PINES DICKINSON IUFFALO MINN PIPELINE BROOKLYN BIRCH MOORE WIL LAKE GOOSE LK ARDEN HILLS N.D. CORCORAN KN.D. OGREENFIELD LEXINGTON BASS LK TWIN KOHLMAN LAKE CROW RIVER LAKES BAYTOWN PACHE VADNAIS APACHE OPLYMOUTH KING HOLLYDALE INDIANA RIVERSIDE ORONO PARKERS DAK DELANO MEDINA LAKE MEDICINE LK PARK TERMINAL PLACE DAKDALE DELANO MEDINA MST HUDSO WESTERN BASSETT ALDRICH GOPHER GLESNLK CREEK AFTON OWATERTN MOUND LEVEE 000 GLEN XN.D. OST LOUIS MERRIAM SOUTH TRAN TOWN WOODBURY BATTLE RIVE DEEPHAVEN ST BONI SHEPARD N.O. ROGERS LAKE BLOOMINGTON AIRPORT EDEN PR GLENMONT RED ROCK STOCKYARDS **O'EXCELSIOR** WILSON & LONE WACONIA EDINA WEST GATE CEDARVALE COTTAGE CHASWSTA WACONIAMV GROVE INVER YANKEE HYLAND DEERWOOD O BLUFF CHEMOLITE LAKE SHAKOPEE RICHVLY BLACK DOG N.O. MINN. RIVER BLUE AUGUSTAMV LS POWER LINDE O CHASKA KOCH WESCOT GROV SOUTH EAGLE SAVAGE HASTINGS SHAKOPEE CREEK CARVER CO SCOTT BURNSVILLE DEAN PRES ROSEMOUNT GLENDALE LAKE

Twin
Cities
345/115
kV Transformers

Xcel Energy

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?