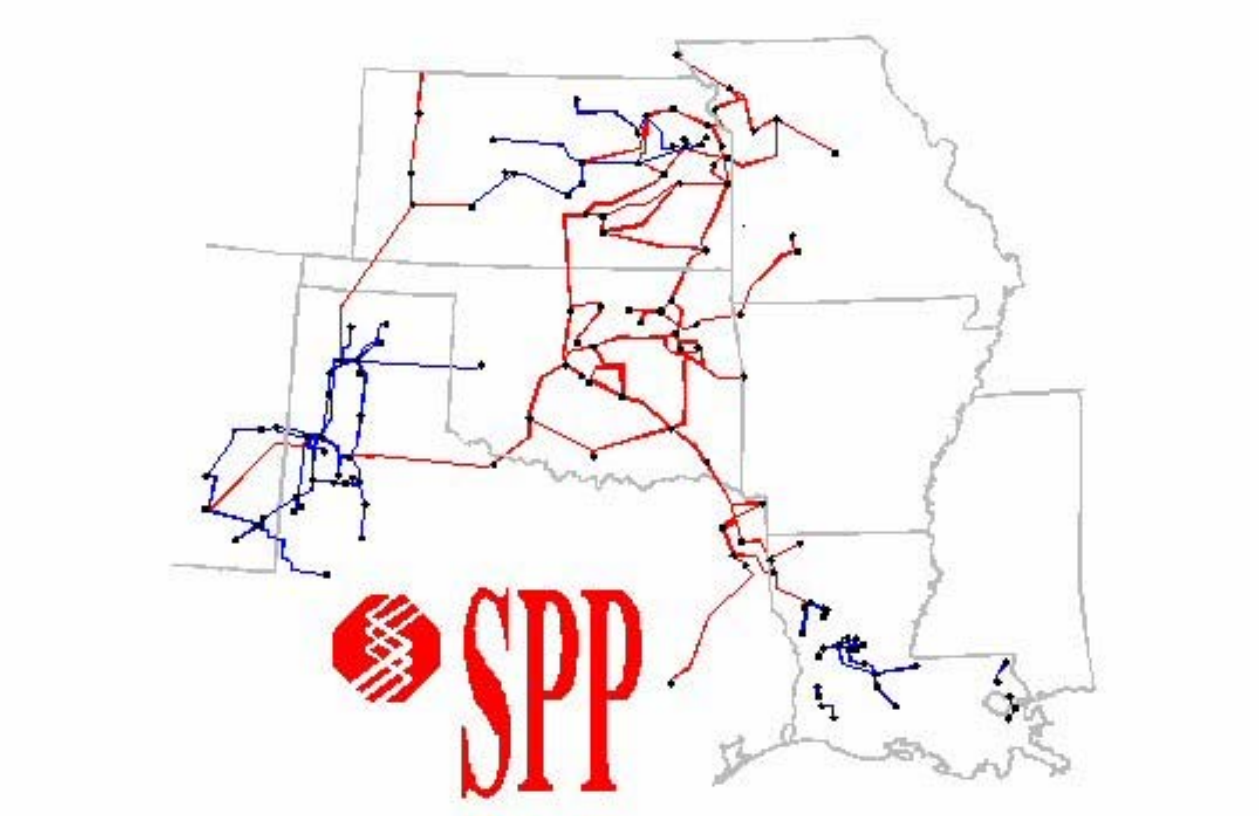
Southwest Power Pool

Intra-Regional Appraisal and Study Observation

2005/06 Winter Peak

Transmission Assessment

DRAFT- Nov 2005



SOUTHWEST POWER POOL
Intra-Regional Appraisal and Study Observation
2005/06 Winter Peak Transmission Assessment

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Overview

In accordance with the MAIN-MRO-SPP (MMS) Agreement to review the reliability of the interconnected system along the interface of the three regions, a study was made to determine the ability of this system to transfer power between MAIN, MRO and SPP, and their respective subregions for the modeled 2005/06 winter peak conditions. The primary goal of this report is to review and assess the overall adequacy of the Southwest Power Pool region's interconnected bulk electric transmission system based on the results of the MMS study.

The specific tasks involved were:

1. Determine the adequacy of the bulk transmission system for numerous contingency conditions.
2. Review the application of operating guides required in this study to assure they perform as intended.
3. Determine areas where special operating procedures might be required to reduce heavy transmission loading during contingency conditions.

Regional transfers were studied with information supplied by neighboring regions. Individual NERC Regions are allowed to simulated transfers using their own criteria defined for transmission assessments. The MAIN-MRO-SPP (MMS) study is performed for winter and winter peaks by a separate study group at the request of NERC. Transfer capability of the inter- and intra-transmission system was also studied as an indicator of the overall adequacy of the transmission system. The simulated transfers do not represent how commercial business is done and should not be used as an indicator of commercially available transmission capacity for the given season. These transfer numbers are not simultaneous and cannot be added together (see NERC document on Transfer Capability).

The NERC Planning Standards define system reliability in terms of adequacy and security. This report addresses system adequacy. This study does not assess system security, which involves the system's response to sudden disturbances and requires the use of study techniques such as short circuit and stability analysis.

This study does not determine if adequate generating capacity exists to create the transfers documented here, especially if the system is experiencing a wide-spread temporary power deficiency as has happened during adverse weather conditions. **The nature of the study was to focus on the bulk transmission network.**

SPP is divided into two sub-regions consisting of the North and South. The North Sub-Region contains the operating companies in the states of Kansas and Missouri. The South Sub-Region contains the remaining companies in SPP which includes all of Oklahoma and parts of Arkansas, Louisiana, Mississippi, New Mexico, and Texas.

Each transfer direction was studied to determine any limiting facilities under any single contingency event (Linear FCITC - First Contingency Incremental Transfer Capability) up to the transfer test level. The three most limiting elements are noted. Operating Guides used are shown as applicable to increase transfer capability.

This study is based on a single "snapshot" which includes many variables and thus, many assumptions. Many of these variables (load, generation dispatch, unit outages, generating

additions, etc.) will change throughout the 2005/06 Winter Peak season, so they will differ from those simulated in the models. These transfer capability numbers, therefore, should be taken as a **guide** to transmission adequacy during 2005/06 winter peak period.

Additional study was performed to evaluate transfer capabilities with respect to voltage limits. This analysis is intended to serve as a screening study for areas of the system that may require further analysis.

A change in the method used in simulating the transfer levels could also vary the values of the transfer capability number. For more specific details on the transmission assessment methodology and procedures, contact the Southwest Power Pool office.

Southwest Power Pool
Sub-Regional Appraisal and Study Observations
2005/06 Winter Peak Transmission Assessment

I. General Observations

The MAIN TASG case was developed from the 2005 Winter Peak model of the SPP 2005 Update 3 series of load flow cases along with models from MAIN, MRO and SERC. The sub-regions of MAIN, MRO and SPP along with member companies are listed below.

SPP-North

The SPP-North sub-region consists of the utilities located principally within the states of Kansas and Missouri. The member systems in the area are:

The Board of Public Utilities, Kansas City
City Power & Light, Independence
City Utilities, Springfield
The Empire District Electric Company
Kansas City Power & Light Company
Midwest Energy Inc.
Sunflower Electric Power Corp.
Aquila, Inc.
- Missouri Public Service Company
- West Plains Energy
- St. Joseph Light & Power

Westar Energy
- Westar Energy, Inc.
- Kansas Gas and Electric Company

SPP-South

The SPP-South sub-region consists of the utilities located principally within the states of Oklahoma, Arkansas, Louisiana, Mississippi, New Mexico, and Texas. The member systems in the area are:

American Electric Power
- AEP Public Service Company of Oklahoma
- AEP Southwestern Electric Power Company

CLECO Power
City of Lafayette, Louisiana
Louisiana Energy & Power Authority
Grand River Dam Authority
Oklahoma Gas & Electric Company
Oklahoma Municipal Power Authority
Southwestern Power Administration
Southwestern Public Service Company
Western Farmers Electric Cooperative

MAIN-South

The member systems in the area are:

Ameren
Central Illinois Light Company
Columbia Water & Light
City Water Light and Power, Springfield, Illinois
Duke Energy Audrain County – IPP Control Area
Electric Energy, Incorporated
Illinois Municipal Electric Agency
Illinois Power Company
Southern Illinois Power Cooperative
Soyland Power Cooperative

Iowa (MRO)

The member systems in the area are:

Mid-American Energy Company
Muscatine Power and Water Company

Minnesota (MRO)

The member systems in the area are:

Dairyland Power Cooperative
Great River Energy
Cooperative Power
United Power Association
Manitoba Hydro-Electric Board
Minnesota Power
Excel Energy Company
Southern Minnesota Power

II. Nonsimultaneous Import Transfer Capabilities (MW) for SPP Sub-Regions

Transfer Direction	2005/06 Winter		2004/05 Winter		2005/06 Winter Overload Element (Outaged Element)	Owner
	FCITC	Notes	FCITC	Notes		
AMRN-SPP-N	500		1500*		Overton 345/161 kV transformer (Overton-Sibley 345 kV)	AMRM (AMRN-MPS)
IOWA-SPP-N	1200*	16,10	1200*		No Limit Found (Each Valid Contingency Tested)	
MINN-SPP-N	1400	4,44	1500*	4,44	Silver Bay Bus Tie 115 kV (Base Case)	MP
SMAIN-SPP-N	500		1500*		Overton 345/161 kV transformer (Overton-Sibley 345 kV)	AMRM (AMRN)
AMRN-SPP-S	1500*		1500*	12	No Limit Found (Each Valid Contingency Tested)	
SPP-S–SPP-N	1500*		1500*		No Limit Found (Each Valid Contingency Tested)	
SPP-N–SPP-S	1200*		1200*		No Limit Found (Each Valid Contingency Tested)	

(1) FCTTC is defined as the scheduled transfers plus the lower of either the FCITC or test level.
(*) Denotes transfer level studied or based upon the transfer level studied.

Operating Guides -- see Section V for description.

(4) Arpin Area Operating Guides
(10) Lake Road-Nashua Operating Guide
(12) Maries Operating Guide
(16) Thomas Hill Operating Guide
(44) Taconite Harbor Special Protection System

SPP-North Imports

SPP-N import FCITC from AMRN is 500 MW limited by the Overton 345/161 kV transformer (AMRN) for the loss of the Overton-Sibley 345 kV line (AMRN-MPS). This level is a decreased from the 1500 MW reported in the 2004/05 winter study with no limitation found.

SPP-N import FCITC from IOWA is 1200 MW. No limit was identified up to this transfer level with the availability of the Thomas Hill Operating Guide and Lake Road-Nashua Operating Guide. This is the same FCITC reported for the 2004/05 winter study with no limiting element identified up to the transfer level.

SPP-N import FCITC from MINN is 1400 MW limited by the Silver Bay Bus Tie 115 kV (MP) for no outages with the availability of Arpin Area Operating Guide and Taconite Harbor Special Protection System. The import FCITC of 1400 MW is a decrease from the 1500 MW FCITC reported in the 2004/05 winter study with no limit found up to the transfer level.

SPP-N import FCITC from SMAIN is 500 MW limited by the Overton 345/161 kV transformer (AMRN) for the loss of the Overton-Sibley 345 kV line (AMRN-MPS). This level is a decreased from the 1500 MW reported in the 2004/05 winter study with no limitation found.

SPP-N import FCITC from SPP-S is 1500 MW. No limiting element was identified up to this transfer level. This is the same FCITC reported for the 2004/05 winter study with no limitation found

SPP-South Imports

SPP-S import FCITC from AMRN is 1500 MW with no limit identified up to the transfer level. This is the same FCITC reported for the 2004/05 winter study with no limiting element identified up to the transfer level with the availability of the Maries Operating Guide.

SPP-S import FCITC from SPP-N is 1200 MW with no limit identified up to this transfer level. This is the same FCITC reported for the 2004/05 winter study with no limitation found

Southwest Power Pool
Inter-Regional Appraisal and Study Observations
2005/06 Winter Peak Transmission Assessment

I. General Observations

Compared to the loads modeled in the 2004/05 winter study, the MAIN, MRO and SPP loads are approximately 4.4%, 2.6% and 0.5% higher, respectively, in this study.

II. Regional First Contingency Incremental Transfer Capability (FCITIC)

The FCITC are incremental above the modeled base case transactions. These values should be considered along with the base case transfers listed in Section VI of this report. The following tables show the FCITC for the SPP Inter-Regional Transfers.

Transfer Direction	2005/06 Winter			2004/05 Winter			2005/06 Winter Limiting Element (2005/06 Winter Outaged Element)	Owner
	FCITC	FCTTC[1]	Notes	FCITC	FCTTC[1]	Notes		
MRO-MAIN	2000*	1850*	4,44	2000*	1550*	4,44	No Limit Found (Each Valid Contingency Tested)	-
SPP-MAIN	2500*	2600*		2400	2500	4	No Limit Found (Each Valid Contingency Tested)	-
MAIN-MRO	2000*	2150*		1850	2300	61	No Limit Found (Each Valid Contingency Tested)	-
SPP-MRO	2000*	1750*		1650	1550		No Limit Found (Each Valid Contingency Tested)	-
MAIN-SPP	2500*	2400		2500*	2400*		No Limit Found (Each Valid Contingency Tested)	
MRO-SPP	2000*	2200*	44,10	2000*	2100*	4,44	No Limit Found (Each Valid Contingency Tested)	
TVA-SPP	1400	1400		1300	1300		Danville-Magazine 161 kV (Ft.Smith-ANO 500 KV)	ESI-AEPW (OKGE-ESI)

([1]) FCTTC is defined as the scheduled transfers plus the lower of either the FCITC or test level.
(*) Denotes transfer level studied or based upon the transfer level studied.

A description of the following guides can be found in Section V:

(4) Arpin Area Operating Guides
(10) Lake Road-Nashua Operating Guide
(61) Poweshiek-Reasnor Emergency Operating Guide
(44) Taconite Harbor Special Protection System

SPP-Imports

The 2005/06 winter import FCITC from MAIN is 2500 MW with no limit found up to the transfer study level. No limit was reported in the 2004/05 winter study.

The 2005/06 winter import FCITC from MRO is 2000 MW. No limit was found up to the transfer study level with the availability of Lake Road-Nashua Operating Guide and Taconite Harbor Special Protection System. No limit was reported up to the transfer level in the 2004/05 winter study with the availability of Arpin Area Operating Guide and Taconite Harbor Special Protection System.

The 2005/06 winter import FCITC from TVA is 1400 MW limited by the Danville-North Magazine 161 kV line (ESI-AEPW) for the outage of Fort Smith-ANO 500 kV line (OKGE-ESI). This level is an increase from the 1300 MW FCITC reported in the 2004/05 winter study with the same limiting facility.

SPP IMPORTS

FROM	TRANSFER CAPABILITY CONDITION	MW	(NOTE)	LIMITING ELEMENT	FLOW	RATING	PTDF/ OTDF	FACILITY OUTAGE(S)
MAIN	IITC	2500*		No Limit Found				None
	FCITC	2500*		No Limit Found				Each Valid Contingency Tested
MRO	IITC	2000*		No Limit Found				None
	FCITC	800	< (44a,R)	Silver Bay Bus Tie 115 kV	91	120E	.036	Laskin 138/115 kV Tr.
		1800	(10A)	Lake Road-Nashua 161 kV	67	153E	.048	Stranger-Iatan 345 kV
		2000*	<-	No Additional Limit Found				Each Valid Contingency Tested
SERCW	IITC	2500*		No Limit Found				None
	FCITC	1500	<=	Danville-Magazine 161 kV	89	148E	.038	Ft.Smith-ANO 500 kV
		2500	(68)	Wells 500/230 Tr.	332	560E	.093	Richard-Wells 500 kV
		2500*		No Additional Limit Found				Each Valid Contingency Tested
TVA	IITC	2500*		No Limit Found				None
	FCITC	1400	<=	Danville-Magazine 161 kV	89	148E	.042	Ft.Smith-ANO 500 kV
		2500*		No Additional Limit Found				Each Valid Contingency Tested
TVAx	IITC	2500*		No Limit Found				None
	FCITC	1300	<=	Danville-Magazine 161 kV	89	148E	.044	Ft.Smith-ANO 500 kV
		1700		Clinton West-Clinton 161 kV	114	167E	.031	Ft.Smith-ANO 500 kV
		2500*		No Additional Limit Found				Each Valid Contingency Tested

Transfer direction with subscript ‘x’ includes uncommitted resources in the exporting subsystem

SPP NORTH (SPP-N) IMPORTS

FROM	TRANSFER CAPABILITY CONDITION	MW	(NOTE)	LIMITING ELEMENT	FLOW	RATING	PTDF/ OTDF	FACILITY OUTAGE(S)
AMRN	IITC	1500*		No Limit Found				None
	FCITC	500	<=	Overton 345/161 kV Tr.	273	291E	.036	Overton-Sibley 345 kV
		1500*		No Additional Limit Found				Each Valid Contingency Tested
AMRNx	IITC	1500*		No Limit Found				None
	FCITC	450	<=	Overton 345/161 kV Tr.	273	291E	.038	Overton-Sibley 345 kV
		900	(16)	Thomas Hill-Salisbury 161 kV	307	335E	.032	Thomas Hill-Moberly 161 kV Moberly-Hinton 161 kV
		1500*		No Additional Limit Found				Each Valid Contingency Tested
IOWA	IITC	1200*		No Limit Found				None
	FCITC	900	(16A)	Thomas Hill-Salisbury 161 kV	307	335E	.030	Thomas Hill-Moberly 161 kV Moberly-Hinton 161 kV
		1700	(10A)	Lake Road-Nashua 161 kV	67	153E	.050	Stranger-Iatan 345 kV
		1200*	<=	No Limit Found				Each Valid Contingency Tested

Transfer direction with subscript ‘x’ includes uncommitted resources in the exporting subsystem

FROM	TRANSFER CAPABILITY CONDITION	MW	(NOTE)	LIMITING ELEMENT	FLOW	RATING	PTDF/ OTDF	FACILITY OUTAGE(S)
MINN	IITC	1400		Silver Bay Bus Tie 115 kV	57	120N	.043	None
		1500*		No Additional Limit Found				Each Valid Contingency Tested
	FCITC	250	<(44a,R)	Silver Bay Bus Tie 115 kV	91	120E	.114	Laskin 138/115 kV Tr.
		1200	(4A)	Arpin 345/138 kV Tr.	279	378E	.079	Arpin-Rocky Run 345 kV
		1400	<-	Silver Bay Bus Tie 115 kV	57	120N	.043	None
SMAIN	IITC	1500*		No Limit Found				None
	FCITC	500	<=	Overton 345/161 kV Tr.	273	291E	.036	Overton-Sibley 345 kV
		1500*		No Additional Limit Found				Each Valid Contingency Tested
SMAINx	IITC	1500*		No Limit Found				None
	FCITC	500	<=	Overton 345/161 kV Tr.	273	291E	.037	Overton-Sibley 345 kV
		850	(16)	Thomas Hill-Salisbury 161 kV	307	335E	.032	Thomas Hill-Moberly 161 kV Moberly-Hinton 161 kV
		1300		Moberly Tap-Moberly 161 kV	293	335E	.031	Salsbury-Thomas Hill 161 kV
		1500*		No Additional Limit Found				Each Valid Contingency Tested
SPP-S	IITC	1500*		No Limit Found				None
	FCITC	1500*	<=	No Limit Found				Each Valid Contingency Tested

Transfer direction with subscript ‘x’ includes uncommitted resources in the exporting subsystem

SPP SOUTH (SPP-S) IMPORTS

FROM	TRANSFER CAPABILITY CONDITION	MW	(NOTE)	LIMITING ELEMENT	FLOW	RATING	PTDF/ OTDF	FACILITY OUTAGE(S)
AMRN	IITC	1500*		No Limit Found				None
	FCITC	1500*	<=	No Limit Found				Each Valid Contingency Tested
AMRNx	IITC	1500*		No Limit Found				None
	FCITC	1500*	<=	No Limit Found				Each Valid Contingency Tested
SPP-N	IITC	1200*		No Limit Found				None
	FCITC	1200*	<=	No Limit Found				Each Valid Contingency Tested

Transfer direction with subscript ‘x’ includes uncommitted resources in the exporting subsystem

Southwest Power Pool
Voltage Study Appraisal
2005/06 Winter Peak Transmission Assessment

Introduction

This study was completed subsequent to completion of the 2005/06 MAIN Winter Transmission Assessment Study with the purpose of evaluating transfer capabilities with respect to voltage limits, and verifying the capability of the transmission system during NERC Category C and D events. MAIN has routinely performed transfer capability studies based on circuit thermal ratings. While this provides a good indication of thermal limitations of the system, it does not ensure that there are not more stringent voltage limitations. Historically, the MAIN region and surrounding regions have been primarily limited by thermal constraints. There have been specific interfaces limited by voltage or voltage stability. These specific interfaces have been analyzed by special studies focusing on only those areas. This study is intended to serve as a screening study for areas of the system that may require further analysis.

The base case used for this study was the same base case as used for the 2005/06 MAIN Winter Transmission Assessment Study in conducting the thermal transfer analyses, except that minor adjustments were made to facilitate the use of A/C solution techniques of PTI's MUST program. The objective of this voltage study was to determine if there were potential voltage limits that are more constraining than the thermal limits identified in the previous thermal study.

Base Case

A review of the 2005/06 winter TASG voltage analysis results showed that no SPP bus voltages fell below the 0.90 per unit SPP criteria for valid single contingencies.

AMRN to SPP-S

The reported thermal FCITC for SPP-S imports from AMRN for winter 2005 was 1500 MW. In this voltage study, the Pirkey, Knoxlee and Wilkes units (860 MW/209 Mvar) were outaged to simulate at least half of the import level. The transfer level simulated was 1700 MW. In this scenario, several Rayburn Country bus voltages fell below the SPP criteria of 0.90 per unit. This problem can be mitigated by turning on extra capacitors that are switched off in the models. Third party limitations have been coordinated and are not of concern. Third party limitations have been coordinated and are not of concern.

MAIN to SPP

The reported thermal FCITC for SPP imports from MAIN for winter 2005 was 2500 MW. In this voltage study, two Jeffrey Energy Centers units (1440 MW/207 Mvar) were outaged to simulate at least half of the import level. The transfer level simulated was

2700 MW. This scenario did not yield any voltage limitations. Third party limitations have been coordinated and are not of concern.

MRO to SPP

The reported thermal FCITC for SPP imports from MAIN for winter 2005 was 2000 MW. In this voltage study, the Sooner, McClain and Riverside Station units (1225 MW/383 Mvar) were outaged to simulate at least half of the import level. The transfer level simulated was 2200 MW. In this scenario, several bus voltages in the Northwest Kansas area fell slightly below the SPP criteria of 0.9 per unit. Sunflower (SECI) is planning to install capacitor banks at Ruleton, and several DVARs near Rhodes and Mingo in near future. Capacitor bank and STATCOM additions that are planned near Plainville will also mitigate these low voltages. Third party limitations have been coordinated and are not of concern.

FOOTNOTES

(R) This element repeats as a limit for other outages.
(A) Availability of operating guide for both emergency and nonemergency transactions will increase capability to the reported FCITC level.
(a) Availability of operating guide for emergency transactions will increase capability to the reported FCITC Level.
(<) Reported FCITC limit for nonemergency transactions.
(<-) Reported FCITC limit for emergency transactions.
(<=) Reported FCITC limit for emergency and nonemergency transactions.
(I) Indicates implementation of a nonemergency operating guide.
(i) Indicates implementation of an emergency operating guide.
(*) Denotes transfer level studied.

Operating Guides

(4) Arpin Area Operating Guides
(10) Lake Road – Nashua Guide
(12) Maries Operating Guide
(16) Thomas Hill Operating Guide
(44) Taconite Harbor Special Protection System
(61) Poweshiek-Reasnor Emergency Operating Guide

Arpin Area Operating Guides (4)

Transmission Owner: ATCLLC

Transmission Operator: MISO/ATCLLC

Control Area: ALTE/WPS

Reliability Coordinator: MISO

Automatic
Post-Contingency Implementation

Guide Description:

Council Creek 69 kV Bus Tie Status

This tie would be expected to be open during high transfer periods. This tie is very sensitive to flows across the interface and studies have shown that it will overload at high transfer levels with all facilities in service. The relays at Council Creek are set to trip 69 kV breaker #335-S in 10 seconds if the flow from Oakdale exceeds 32 MVA or the flow from Monroe County exceeds 50 MVA.

Post - Contingency Mitigation
Upon the loss of Arpin-Rocky Run 345kV:

The Port Edwards 138kV System

The Arpin 345-138 kV transformer and the Arpin-Port Edwards 138 kV system are both susceptible to overloading for the outage of the Arpin-Rocky Run 345 kV line. To prevent this, the relays at Port Edwards will trip breaker #421 on the Wautoma 138 kV line and breaker #436 on the Saratoga 138 kV line when the flow from Lakehead Vesper reaches 231 MVA.

The Hillsboro-Hilltop 69 kV Line

This line is sensitive to loss of the Arpin-Rocky Run 345 kV line and will overload. The relays at Hilltop are set to trip 69 kV breaker #569 at Hilltop if the flow is greater than or equal to 72 MVA.

The Lublin-Lakehead 69 kV Line

This line is also sensitive to the loss of the Arpin-Rocky Run 345 kV line. The DPC system operators will open this line by supervisory control in response to sag limitations at 27 MVA and above, depending on ambient temperature. The relays at Lublin are set to operate breaker #12NB56 automatically at 47 MVA.

The T-Corners Area 115 kV System

Open Wien-Stratford 115kV. The Arpin 138-115 kV transformer and the Arpin-

Hume-Wildwood-McMillan-Stratford-Wien 115 kV system is susceptible to overloading for the outage of the Arpin-Rocky Run 345 kV line with the Port Edwards 138 kV lines open at high transfer levels. The relay setting at Wien will trip the B-54 breaker on the Wien-Stratford 115 kV line at 90 MVA in 10 seconds. This protects the Marshfield 115 kV system from overload and will also limit the Arpin 138-115 kV transformer to approximately 160 MVA with normal Marshfield system peak loads.

ATCLLC will test the line from Arpin to determine if the fault is temporary or permanent.

***Temporary Fault**:* The line is available to the network. A minimum 5-minute time delay from the original trip is required to discharge capacitor banks before attempting to loop the Arpin-Rocky Run 345 kV line. These capacitor banks are required to maintain adequate system voltage at high transfer levels and are required to be available when closing the loop. These include:

Eau Claire 161 kV – (4) 88.0 MVAR switched
Arpin 138 kV - (1) 50.0 MVAR switched
T-Corners 115 kV – (1) 20.0 MVAR and (4) 30.0 MVAR
Wien 115 kV – (3) 21.6 MVAR (manually switched)

Prior to re-closing at Arpin, the ATCLLC system operator contacts the WPS system operator, who notifies the Weston generating station of the situation and requests that the station prepare for re-closure of the Arpin-Rocky Run facility. The ATCLLC system operator verifies with the WPS system operator that the Weston generating units are prepared for networking the 345 kV system. The ATCLLC system operator verifies with XEL that the Eau Claire capacitors are available. The ATCLLC system operator verifies that the Arpin capacitors are available. The ATCLLC system operator verifies that the T Corners-Wien 115 kV line is closed. The ATCLLC system operator closes the 345 kV line breaker at Arpin.

Permanent Fault: If the Arpin-Rocky Run 345 kV line cannot be successfully re-closed and it is determined that the outage is not of a temporary nature, additional measures need to be taken by the system operators to prepare for the next contingency. The next worst contingency with Arpin-Rocky Run 345 kV out of service is expected to be Rocky Run-North Appleton 345 kV. The next contingency would have very serious consequences and would require the curtailment of schedules across the Minnesota-Eastern Wisconsin interface. To prepare for the next contingency and reduce its' severity, the following steps should be followed.

Post-Contingency Operation for a Permanent Fault

The ATCLLC system operator contacts the WPS system operator, who notifies the Weston generating plant of the permanent fault situation. ATCLLC will take necessary action to return the system to a secure state. ATCLLC will review real-time security analysis to determine necessary actions. This may include, but is not limited to:

a. Initiating TLR (as needed) for the Rocky Run-North Appleton contingency (ATCLLC).
b. Initiating TLR (as needed) for the Prairie Island-Byron contingency (XEL).

Pre – Contingency loading of Eau Claire-Arpin

At a loading level of 765 MW, ATC and MISO will coordinate the issuance of TLR Level 1. At a loading level of 790 MW, ATC and MISO will coordinate issuance of the appropriate TLR level to avoid increasing the flow above the 790 MW limit. [2] Before TLR Level 2 or higher is called, MISO should identify all Firm Redispatch (FRD) on the Eau Claire-Arpin flowgate. All available FRD should be utilized. The MISO Security Coordinator will maintain the real-time flow as measured at Eau Claire, on the Eau Claire-Arpin 345 kV line to a maximum value of 790 MW. The MISO Security Coordinator may limit the pre-contingent flow to less than 790 MW if real-time studies, including, but not limited to, the daily voltage stability study indicate a need for reduction to a lesser value.

Post - Contingency Mitigation

Upon the loss of King-Eau Claire-Arpin 345kV or the Eau Claire-Arpin 345kV line:

The Hillsboro-Hilltop 69 kV Line

This line is very sensitive to loss of the Eau Claire-Arpin 345 kV line and will overload. The relays at Hilltop are set to trip 69 kV breaker # 569 at Hilltop if the flow is greater than or equal to 72 MVA.

The Lublin-Lakehead 69 kV Line

This line is also sensitive to the loss of the Eau Claire-Arpin 345 kV line. The DPC system operators will open this line by supervisory control in response to sag limitations at 27 MVA and above, depending on ambient temperature. The relays at Lublin are set to operate breaker #12NB56 automatically at 47 MVA.

The T-Corners Area 115 kV System

The Hydro Lane-T Corners-Wien 115 kV line and the Wien-McMillan-Wildwood-Hume-Arpin 115 kV systems are susceptible to overloading for the outage of any portion of the King-Eau Claire-Arpin 345kV line. The relays at Wien are set to open the B-54 breaker on the Wien-Stratford 115 kV line when the flow exceeds 90 MVA for 10 seconds. This operation will prevent the Marshfield 115 kV system from overloading. If this line does not trip automatically, the ATCLLC system operator should open the B-54 breaker at Wien via supervisory control if system conditions are such that opening the line will improve conditions on the 115 kV system.

XEL and ATCLLC will test the line from Eau Claire to determine if the fault is temporary or permanent.

Temporary Fault: The line is available to the network. A minimum 5-minute time delay from the original trip is required to discharge capacitor banks before attempting to loop the Eau Claire-Arpin 345 kV line. These capacitor banks are required to maintain adequate system voltage at high transfer levels and are required to be available when closing the loop. These include:

Eau Claire 161kV – (4) 88 MVAR switched
Arpin 138kV - (1) 50 MVAR switched
T-Corners 115 kV – (4) 30 MVAR switched

Prior to re-closing at Arpin, the ATCLLC system operator notifies the Weston generating station of the situation and requests that the station prepare for re-closure of the Eau Claire-Arpin facility. The ATCLLC system operator verifies that the Weston generating units are prepared for networking the 345 kV system. The ATCLLC system operator verifies that the T Corners-Wien 115 kV line is closed. The ATCLLC system operator verifies with XEL that the Eau Claire capacitors are available and that the King-Eau Claire 345 kV line is closed. The ATCLLC system operator verifies with XEL that the Eau Claire end of the line is closed. The ATCLLC system operator verifies that the Arpin capacitors are available. The ATCLLC system operator closes the 345 kV line breaker at Arpin.

Permanent Fault: If the Eau Claire-Arpin 345 kV line cannot be successfully reclosed and it is determined that the outage is not of a temporary nature, additional measures need to be taken by the system operators to prepare for the next contingency. The next worst contingency with Eau Claire-Arpin 345 kV line out of service is expected to be Prairie Island-Byron 345 kV line. The next contingency would have very serious consequences and would require the curtailment of schedules across this interface and south of Twin Cities. To prepare for the next contingency and reduce its' severity, the steps in section 5.3 should be followed.

Post-Contingency Operation for a Permanent Fault

The ATCLLC system operator notifies the Weston generating plant of the permanent fault situation. The ATCLLC system operators assess system conditions to determine if complete separation of the Minnesota-Eastern Wisconsin tie is necessary. Upon verification that complete interface separation is necessary to protect the NSP/DPC 69 kV system, open breaker #W-23 at Wien on the Wien-T Corners line. Under certain high transfer system condition during a permanent Eau Claire-Arpin outage, if the power flow on the T-corners to Wien (W-23) line is over 88 MW, one T-Corners 115/69 kV transformer may be overloaded for loss of the Hydro Lane to T-Corners 115 kV line. Leaving this line in service during a permanent Eau Claire-Arpin outage could result in system violations in western and central Wisconsin for the next contingency. Close breaker #B-54 on the Wien-Stratford 115 kV line. ATCLLC and XEL will take necessary action to return the system to a secure state. ATCLLC, XEL, and MISO will review real-time security analysis to determine necessary actions. This may include, but is not limited to:

a. Initiating TLR (as needed) for the Prairie Island-Byron contingency (XEL).
b. Initiating TLR (as needed) for the Wempletown-Paddock contingency (ATCLLC).

The Arpin Area Operating guides are automatic and do not require operator intervention.

The Arpin Area Operating guides are automatic and do not make use of short-term ratings for limiting facilities.

Arpin Area Opertng Guides are updated annually by ATC, DPC and XEL based on MISO request and are assessed on an as needed basis. They are studied by simulating contingencies for both the pre-implementation and post-implementation of the operating guide in internal as well as regional studies.

Lake Road-Nashua Operating Guide (10)

Transmission Owner: KCPL

Transmission Operator: KCPL

Control Area: KCPL

Reliability Coordinator: SPP

Automatic
Post-Contingency Implementation

Guide Description:

The Lake Road-Nashua operating guide is implemented automatically on a post-contingency basis. The guide calls for corrective action to relieve overloads on the Lake Road to Nashua 161 kV line with either the St Joe-Hawthorn 345 kV line outage or the Iatan-Stranger Creek 345 kV line outage. The Lake Road-Nashua 161 kV line is opened automatically. The Lake Road-Nashua operating guide is unconditionally available.

Automatic overcurrent relays will trip the breakers associated with this line at normal clearing time of 10.8 cycles.

The continuous normal summer rating and 8 hour emergency summer rating of the Lake Road-Nashua 161 kV line is 153 MVA and 172 MVA, respectively. No special short-term rating is used.

The effectiveness of this guide was initially assessed by transfer study analysis and continues to be studied seasonally by contingency analysis.

Maries Operating Guide (12)

Transmission Owner: Associated Elec Coop (AECI)

Transmission Operator: AECI Control Area: AECI

Reliability Coordinator: TVA

Post-Contingency Implementation : Operator Intervention

Guide Description:

The Maries 161/138 kV transformer limits transfers in the 138/161 kV direction for the outage of the Bland-Franks 345 kV line. The limitation imposed by this transformer is a local area problem because the Maries-Osage-1 138 kV line can be opened at Maries by supervisory control on a post-contingency basis. This action reduces the flow on the Maries 161/138 kV transformer to a level at which transfers can continue up to the next limit. The Maries operating guide is unconditionally available. For post-contingency operating steps, the approximate time required to implement guide is five to ten minutes. The Maries 138/161 transformer has a thirty minute 150% overload capability. AECI assesses its operating guides during internal seasonal operating studies performed on an annual basis.

Thomas Hill Operating Guide (16)

Transmission Owner: Associated Elec Coop (AECI)

Transmission Operator: AECI

Control Area: AECI

Reliability Coordinator: TVA

Post-Contingency Implementation
Operator Intervention

Guide Description:

The Thomas Hill operating guide calls for manually reducing generation at Thomas Hill, on a post-contingency basis, during a first contingency until all in-service Thomas Hill outlet elements are loaded at or below their respective emergency ratings. The Thomas Hill operating guide can be used for remote facilities when one of the Thomas Hill outlet facilities would pose a more severe limit causing the guide to already be in effect. The Thomas Hill operating guide is unconditionally available.

The approximate time required to implement this guide is ten to fifteen minutes.

The pre-contingency loading of the Thomas Hill outlet facilities provide a fifteen minute operating window before the facilities reach the conductor temperature associated with the modeled 372 MVA emergency rating.

AECI assesses its operating guides during internal seasonal operating studies performed on an annual basis.

Taconite Harbor Special Protection System (44)

Transmission Owner: Minnesota Power

Transmission Operator: MP

Control Area: MP

Reliability Coordinator: MISO

Automatic
Post-Contingency Implementation

Guide Description:

MRO systems **do not implement operating procedures for the purpose of increasing non-emergency transfers.** However, if a situation exists where a utility requires emergency import, the MRO system(s) responsible for the operating procedure will implement the procedure only as long as the implementation of the guide isn't detrimental to the network or system reliability. The Taconite Harbor special protection system is designed to automatically reduce generation at the Taconite Harbor plant in response to contingent overloads of the portion of the system known as the North Shore Loop. The North shore loop system consists of all transmission lines directly connected to the following stations: Laskin, Hoyt Lakes, Taconite Harbor, and Silver Bay. Should any of these lines (described above) become overloaded, the Taconite Harbor generation will automatically be run back such that all remaining lines are within their long term continuous rating. This action is automatic and not dependant on operator action.

The approximate time required to implement this guide is 10 Minutes.

Based on engineering judgment, MP believes that the post-contingency loading of the transmission lines known as the North Shore Loop would be acceptable provided the pre-contingency line flow does not exceed the normal ratings of the lines. These acceptable post-contingency loadings may exceed emergency ratings during the 10 minutes it would take to implement the special protection system.

The Taconite Harbor Special Protection System is assessed on an as needed basis and is studied by simulating contingencies for both the pre-implementation and post-implementation of the operating guide in internal as well as regional studies.

Poweshiek-Reasnor Emergency Operating Guide (61)

Transmission Owner: MEC and ALTW

Transmission Operator: MISO

Control Area: ALTW

Reliability Coordinator: MISO

Post-Contingency Implementation : Operator Intervention

Guide Description:

This guide is implemented using supervisory control. An outage of the Montezuma - Bondurant 345 kV line (MEC) can cause overloads on the Powshiek – Reasnor 161 kV line (ALTW). This limit to transfers may be eliminated during emergency situations by opening the Reasnor - Des Moines 161 kV line (MEC). Knoxville – Pleasantville 69 kV line (MEC), Prairie City – S.E. 124th St. 69 kV line (MEC), and the West Osceola – Osceola Tap 69 kV line (ALTW). This operating guide will not be used to increase non-emergency transactions. For post-contingency operating steps, the approximate time required to implement guide is 10 minutes. Short-term rating of limiting facilities and duration for which the rating can be used is 308 MVA for 10 minutes. MISO, in conjunction with the Transmission Owner reevaluates this operating guide annually.

Basecase Schedules for 2005/06 Winter Peak

FROM		TO			MW Interchange	
Region	Co.	Region	Co.		2005/06 W	2004/05 W
MAIN	ALTE	MRO	DPC		-5	-5
MAIN	ALTE	MRO	XEL		61	61
MAIN	AMRN	MRO	MEC		3	0
MAIN	ALTW	MRO	DPC		-14	-13
MAIN	ALTW	MRO	GRE		-87	-79
MAIN	ALTW	MRO	MEC		-146	-15
MAIN	ALTW	MRO	MPW		0	5
MAIN	ALTW	MRO	XEL		-16	-2
MAIN	ALTW	MRO	SMP		-36	4
MAIN	ALTW	MRO	WAPA		-72	-61
MAIN	NI	MRO	GRE		50	0
MAIN	NI	MRO	MEC	MEC's Share of Quad Cities	434	434
MAIN	NI	MRO	MEC		300	335
MAIN	IP	MRO	XEL		0	102
MAIN	MGE	MRO	DPC		-30	-30
MAIN	WEC	MRO	MP		-62	-62
MAIN	WEC	MRO	XEL		-42	-42
MAIN	WPS	MRO	MHEB		-108	-108
MAIN	WPS	MRO	MP		-76	-76
	MAIN to MRO Net				**154**	**448**
MAIN	AMRN	SPP	SPA		-16	-16
MAIN	CWL	SPP	KACY		-20	-20
MAIN	CWL	SPP	SPA		-79	-61
MAIN	CWL	SPP	SPRM		-8	-8
	MAIN to SPP Net				**-123**	**-105**
MRO	NPPD	SPP	MPS		175	100
MRO	MEC	SPP	KCPL		50	0
MRO	WAPA	SPP	SECI		3	3
	MRO to SPP Net				**228**	**103**