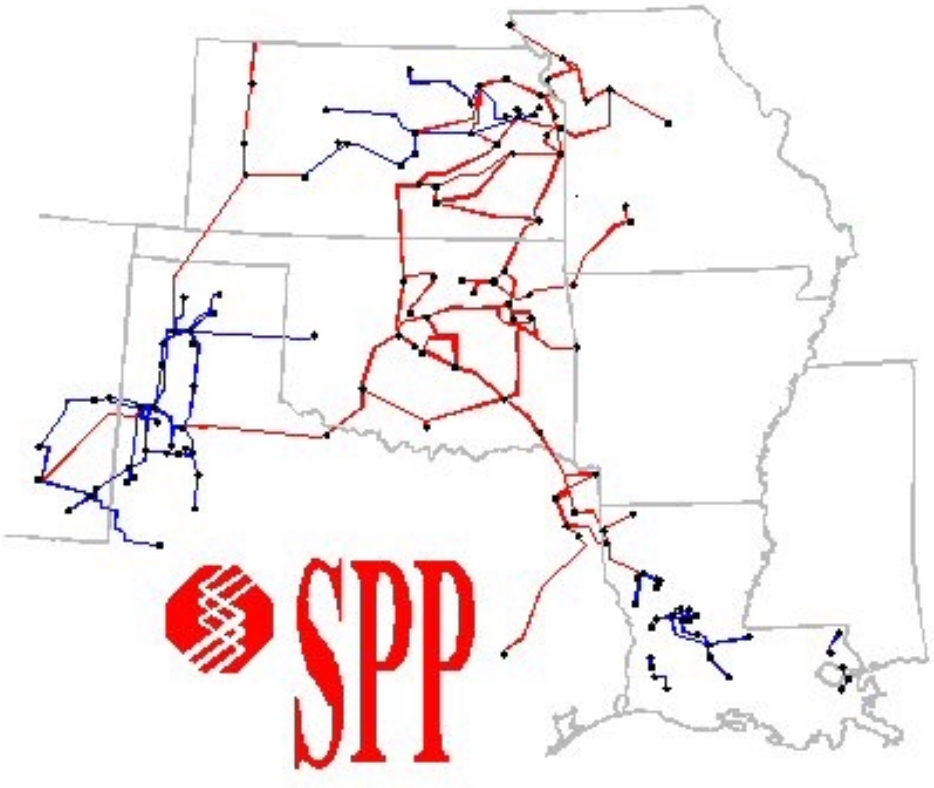
Southwest Power Pool

Intra-Regional Appraisal and Study Observation

2004 Summer Peak

Transmission Assessment

April 2004



SOUTHWEST POWER POOL
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TABLE OF CONTENTS

I. Overview

II. Appraisals

a. SPP – Sub-Regional

b. SPP – Inter-Regional

III. Summary of Results

IV. Operating Guides

V. Base Case Schedules

Overview

In accordance with the MAIN-MAPP-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, MAPP and SPP, and their respective subregions for the modeled 2004 summer 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-MAPP-SPP (MMS) study is performed for summer 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 four 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 2004 Summer 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 2004 summer peak period.

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
2004 Summer Peak Transmission Assessment

I. General Observations

The MAIN TASG case was developed from the 2004 Summer Peak model of the SPP 2004 Update 1 series of load flow cases along with models from MAIN, MAPP and SERC. The sub-regions of MAIN, MAPP 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

Central Louisiana Electric Company
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
Duke Energy McClain

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 (MAPP)

The member systems in the area are :

Mid-American Energy Company
Muscatine Power and Water Company

Minnesota (MAPP)

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	2004 Summer		2003 Summer		2004 Summer Limiting Element (2004 Summer Outaged Element)	Owner
	FCITC	Notes	FCITC	Notes		
AMRN-SPP-N	1200		1500*		Fort Smith 500/161 kV Tr. (Fort Smith 500/345 kV Tr.)	OKGE (OKGE)
IOWA-SPP-N	1200*		1200*		No Limit Found (Each Valid Contingency Tested)	
MINN-SPP-N	1200	4,23,44	900	4,44	Sheffield-Hampton 161 kV (Emery-Floyd 161 kV)	(MEC) (ALTW-MEC)
SMAIN-SPP-N	1100		1500		Fort Smith 500/161 kV Tr. (Fort Smith 500/345 kV Tr.)	OKGE (OKGE)
AMRN-SPP-S	400		1100		Fort Smith 500/161 kV Tr. (Fort Smith 345/161 kV Tr.)	OKGE (OKGE)
SPP-S–SPP-N	1200		1100		Brookline-Morgan 161 kV (McCredie-Montgomery 345 kV) (McCredie-Overton 345 kV)	SPRM-AECI (AMRN) (AMRN)
SPP-N–SPP-S	1200*	65	1200*		No Limit Found (Each Valid Contingency Tested)	

(*) Denotes transfer level studied.
(I) Indicates the implementation of a nonemergency guide.
(i) Indicates the implementation of an emergency guide.
(4) Arpin Area Operating Guides
(23) Boswell Special Protection System
(44) Taconite Harbor Emergency Operating Guide (2003S)
(44) Taconite Harbor Special Protection System (2004S)
(65) Lawrence Hill Operating Guide

SPP-North Imports

SPP-N import FCITC from AMRN is 1200 MW limited by the Fort Smith 500/161 kV transformer (OKGE) for the outage of Fort Smith 500/345 kV transformer (OKGE). No limit was reported in the 2003 summer study up to the transfer level. With IPP participation in the AMRN export transfer points, SPP-N import FCITC from AMRN decreased by another 100 MW.

SPP-N import FCITC from IOWA is 1200 MW. No limiting element was identified up to this transfer level. This is the same FCITC reported for the 2003 summer study with no limiting element identified up to the transfer level.

SPP-N import FCITC from MINN is 1200 MW limited by the Sheffield-Hampton 161 kV (MEC) for the outage of Emery-Floyd 161 kV (ALTW-MEC) with the availability of Arpin Area operating guides, Boswell operating guide and the Taconite Harbor operating guide. The import FCITC of 1200 MW is an increase from the 900 MW FCITC reported in the 2003 summer study by the Lime Creek-Emery 161 kV line (ALTW) for the outage of Hazleton-Adams 345 kV line (ALTW-NSP) with the availability of the Arpin Area Operating Guides and the Taconite Harbor Emergency Operating Guide.

SPP-N import FCITC from SMAIN is 1100 MW limited by the Fort Smith 500/161 kV transformer (OKGE) for the outage of Fort Smith 500/345 kV transformer (OKGE). The import FCITC of 1100 MW is a decrease from the 1500 MW reported in the 2003 summer study limited by Muskogee-Clarksville 345 kV (OKGE-AEPW) for the outage of Riverside Station-Muskogee 345 kV (OKGE-AEPW).

SPP-N import FCITC from SPP-S is 1200 MW limited by the Brookline-Morgan 161 kV (SPRM-AECI) for the outage of McCredie-Montgomery 345 kV (AMRN) and McCredie-Overton 345 kV (AMRN). The import FCITC of 1200MW is an increase from the 1100MW FCITC reported in 2003 summer study limited by Muskogee-Clarksville 345 kV (OKGE-AEPW) for the outage of Riverside Station-Muskogee 345 kV (OKGE-AEPW)

SPP-South Imports

SPP-S import FCITC from AMRN is 400 MW limited by the Fort Smith 500/161 kV transformer (OKGE) for the outage of Fort Smith 345/161 kV transformer (OKGE). This level is a decrease from the 1100 MW FCITC reported in the 2003 summer study with the same limiting element and outage.

SPP-S import FCITC from SPP-N is 1200 MW with no limit identified up to the transfer level with the availability of Lawrence Hill Operating Guide. This is the same FCITC reported in 2003 summer with no limiting element identified.

Southwest Power Pool
Inter-Regional Appraisal and Study Observations
2004 Summer Peak Transmission Assessment

I. General Observations

Compared to the loads modeled in the 2003 summer study, the MAIN and MAPP loads are approximately 2.7% and 0.9% higher, respectively, in this study, and the SPP load is approximately the same.

Regional imports into SPP from MAIN, SERCW and TVA as well as sub-regional imports into SPP-S from AMRN are limited by the Fort Smith 500/161 kV transformer for the outage of Fort Smith 345/161 kV transformer. Linear analysis showed SPP imports to be in the range of 300-400MW FCITC. SPP further conducted AC analysis on the limit and confirmed even lower import FCITC, possibly in the range of 0 MW FCITC.

The Fort Smith transformer has been a limiting constraint to transfers in previous TASG studies. The loading on the transformer increased further this summer due to dispatch changes in the surrounding area. OKGE is in the process of adding a second Fort Smith 500/161 kV transformer to address the limitation. However, the planned upgrade will only be completed by November of this year. SPP and OKGE are currently pursuing short-term options (Operating Guides) to alleviate potential overloads on the Fort Smith transformer during the summer load season.

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 V of this report. The following tables show the FCITC for the SPP Inter-Regional Transfers.

Transfer Direction	2004 Summer		2003 Summer		2004 Summer Limiting Element (2004 Summer Outaged Element)	Owner
	FCITC	Notes	FCITC	Notes		
MAPP-MAIN	2000*	4,44	1600	4,44	No Limit Found (Each Valid Contingency Tested)	
SPP-MAIN	2500*	4	2000	4	No Limit Found (Each Valid Contingency Tested)	
MAIN-MAPP	200		1000		Salem 345/161 kV Tr. (Sub 91-Quad Cities 345 kV) (Sub 91 345/161 kV Tr.) (Davenport-Sub 91 345 kV)	ALTW (MEC-ComEd) (MEC) (MEC)
SPP-MAPP	850		1100		Salem 345/161 kV Tr. (Hazleton-Arnold 345 kV)	ALTW (ALTW-MEC)
MAIN-SPP	400		1100		Fort Smith 500/161 kV Tr. (Fort Smith 345/161 kV Tr.)	OKGE (OKGE)
MAPP-SPP	1400	4,44	1950	4,44	Fort Smith 500/161 kV Tr. (Fort Smith 500/345 kV Tr.)	OKGE (OKGE)
TVA-SPP	300		750		Fort Smith 500/161 kV Tr. (Fort Smith 345/161 kV Tr.)	OKGE (OKGE)

(*) Denotes transfer level studied.
(I) Indicates the implementation of a nonemergency guide.
(i) Indicates the implementation of an emergency guide.
(4) Arpin Area Operating Guides
(44) Taconite Harbor Emergency Operating Guide (2003S)
(44) Taconite Harbor Special Protection System (2004S)

SPP-Imports

The SPP import FCITC from MAIN is 400 MW limited by the Fort Smith 500/161 kV transformer (OKGE) for the outage of Fort Smith 345/161 kV transformer (OKGE). This level is a decrease from the 1100 MW FCITC reported in the 2003 summer study with the same limiting element and outage.

The SPP import FCITC from MAPP is 1400 MW limited by the Fort Smith 500/161 kV transformer (OKGE) for the outage of Fort Smith 500/345 kV transformer (OKGE). This level is a decrease from the 1950 MW FCITC reported in the 2003 summer study with the same limiting element.

The SPP import FCITC from TVA is 300 MW limited by the Fort Smith 500/161 kV transformer (OKGE) for the outage of Fort Smith 345/161 kV transformer (OKGE). This level is a decrease from the 750 MW FCITC reported in the 2003 summer with the same limiting element and outage.

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	400	<= (R)	Ft. Smith 500/161 kV Tr.	459	473E	.033	Ft. Smith 345/161 kV Tr.
		2250		ANO-Russellville North 161 kV	326	396E	.031	Ft. Smith-ANO 500 kV
		2500*		No Additional Limit Found				Each Valid Contingency Tested
MAINx	IITC	2500*		No Limit Found				None
	FCITC	400	<= (R)	Ft. Smith 500/161 kV Tr.	459	473E	.034	Ft. Smith 345/161 kV Tr.
		2000		Franks 345/161 kV Tr.	326	391E	.032	Franks-Huben 345 kV Huben-Morgan 345 kV
		2200		ANO-Russellville North 161 kV	326	396E	.031	Ft. Smith-ANO 500 kV
		2500*		No Additional Limit Found				Each Valid Contingency Tested
MAPP	IITC	2000*		No Limit Found				None
	FCITC	900	<(44a,R)	Hoyt Lake-Laskin 138 kV	59	106E	.052	Silver Bay Bus Tie 115 kV
		900	(44a,R)	Silver Bay Bus Tie 115 kV	59	107E	.052	Laskin 138/115 kV Tr.
		1000	(4A)	Arpin 345/138 kV Tr.	291	336E	.045	Arpin-Rocky Run 345 kV
		1400	<-	Ft. Smith 500/161 kV Tr.	400	473E	.053	Ft. Smith 500/345 kV Tr.
		1800	(10A)	Lake Road-Nashua 161 kV	85	172E	.048	Stranger-Iatan 345 kV
		2000*		No Additional Limit Found				Each Valid Contingency Tested
SERCW	IITC	2500*		No Limit Found				None
	FCITC	300	<=	Ft.Smith 500/161 kV Tr.	459	473E	.045	Ft. Smith 345/161 kV Tr.
		800		Danville-Magazine 161 kV	115	148E	.040	Ft. Smith-ANO 500 kV
		1600	(R)	ANO-Russellville North 161 kV	326	396E	.045	Ft. Smith-ANO 500 KV
		1800		Ft. Smith 345/161 kV Tr.	432	490E	.032	Ft. Smith 500/161 kV Tr.
		2100	(66A)	Holden-Pittsville 161 kV	65	227E	.077	Clinton-Holden 161 kV

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

FROM	TRANSFER CAPABILITY CONDITION	MW	(NOTE)	LIMITING ELEMENT	FLOW	RATING	PTDF/ OTDF	FACILITY OUTAGE(S)
SERCW	FCITC	2400		Muskogee-Clarksville 345 kV	804	895E	.038	Riverside Station-Muskogee 345 kV
		2500*		No Additional Limit Found				Each Valid Contingency Tested
TVA	IITC	2500*		No Limit Found				None
	FCITC	300	<= (R)	Ft. Smith 500/161 kV Tr.	459	473E	.049	Ft. Smith 345/161 kV Tr.
		750		Danville-Magazine 161 kV	115	148E	.043	Ft. Smith-ANO 500 kV
		1400	(R)	ANO-Russellville North 161 kV	326	396E	.049	Ft. Smith-ANO 500 kV
		1600		Ft. Smith 345/161 kV Tr.	432	490E	.037	Ft. Smith 500/161 kV Tr.
		2000		Franks 345/161 kV Tr.	326	391E	.032	Franks-Huben 345 kV Huben-Morgan 345 kV
		2300		Muskogee-Clarksville 345 kV	804	895E	.039	Riverside Station-Muskogee 345 kV
		2300		Ft. Smith 500/345 kV Tr.	379	719E	.147	Ft. Smith 500/161 kV Tr.
		2500*		No Additional Limit Found				Each Valid Contingency Tested
TVAx	IITC	2500*		No Limit Found				None
	FCITC	300	<= (R)	Ft. Smith 500/161 kV Tr.	459	473E	.051	Ft. Smith 345/161 kV Tr.
		750		Danville-Magazine 161 kV	115	148E	.045	Ft. Smith-ANO 500 kV
		1400	(R)	ANO-Russellville North 161 kV	326	396E	.051	Ft. Smith-ANO 500 kV
		1600		Ft. Smith 345/161 kV Tr.	432	490E	.036	Ft. Smith 500/161 kV Tr.
		2100		Franks 345/161 kV Tr.	326	391E	.032	Franks-Huben 345 kV Huben-Morgan 345 kV
		2100		Muskogee-Clarksville 345 kV	804	895E	.043	Riverside Station-Muskogee 345 kV
		2200		Ft. Smith 500/345 kV Tr.	379	719E	.152	Ft. Smith 500/161 kV Tr.
		2500*		No Additional Limit Found				Each Valid Contingency Tested

Transfer direction with subscript ‘x’ includes uncommitted resources in the exporing 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	1200	<=	Ft. Smith 500/161 kV Tr.	400	473E	.063	Ft. Smith 500/345 kV Tr.
		1300	(12A)	Maries 138/161 kV Tr	60	100E	.031	Bland-Franks 345 kV
		1500*		No Additional Limit Found				Each Valid Contingency Tested
AMRNx	IITC	1500*		No Limit Found				None
	FCITC	1100	<=	Ft. Smith 500/161 kV Tr.	400	473E	.065	Ft. Smith 500/345 kV Tr.
		1400	(16A)	Thomas Hill-Salisbury 161 kV	292	334E	.031	Thomas Hill-Moberly Tap 161 kV Moberly Tap-Hinton 161 kV
		1500*		No Additional Limit Found				Each Valid Contingency Tested
IOWA	IITC	1200*		No Limit Found				None
		1200*	<=	No Limit Found				Each Valid Contingency Tested
MINN	IITC	1100	(44a)	Hoyt Lake-Laskin 138 kV	13	96N	.077	None
		1400	(44a)	Silver Bay Bus Tie 115 kV	47	97N	.036	None
		1500	(44a)	Silver Bay-Waldo 115 kV	44	97N	.036	None
		1500*		No Additional Limit Found				None
	FCITC	0	< (23a)	Blackberry-Boswell 230 kV ckt 2	476	437E	.058	Blackberry-Boswell 230 kV ckt 1
		400	(44a,R)	Hoyt Lake-Laskin 138 kV	59	106E	.113	Silver Bay Bus Tie 115 kV
		400	(44a,R)	Silver Bay Bus Tie 115 kV	59	107E	.113	Laskin 138/115 kV Tr.
		500	(4A)	Arpin 345/138 kV Tr.	291	336E	.086	Arpin-Rocky Run 345 kV
		1100	(44a)	Hoyt Lake-Laskin 138 kV	13	96N	.077	None
		1200	<-	Sheffield-Hampton 161 kV	162	202E	.033	Emery-Floyd 161 kV
		1400	(44a)	Silver Bay Bus Tie 115 kV	47	97N	.036	None

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

FROM	TRANSFER CAPABILITY CONDITION	MW	(NOTE)	LIMITING ELEMENT	FLOW	RATING	PTDF/ OTDF	FACILITY OUTAGE(S)
MINN	FCITC	1500	(44a)	Silver Bay-Waldo 115 kV	44	97N	.036	None
		1500 *		No Additional Limit Found				Each Valid Contingency Tested
SMAIN	IITC	1500*		No Limit Found				None
	FCITC	1100	<=	Ft. Smith 500/161 kV Tr.	400	473E	.066	Ft. Smith 500/345 kV Tr.
		1500*		No Additional Limit Found				Each Valid Contingency Tested
SMAINx	IITC	1500*		No Limit Found				None
	FCITC	1100	<=	Ft. Smith 500/161 kV Tr.	400	473E	.067	Ft. Smith 500/345 kV Tr.
		1300	(16A)	Thomas Hill-Salisbury 161 kV	292	334E	.032	Thomas Hill-Moberly Tap 161 kV Moberly Tap-Hinton 161 kV
		1500*		No Additional Limit Found				Each Valid Contingency Tested
SPP-S	IITC	1500*		No Limit Found				None
	FCITC	1200	<= (R)	Brookline-Morgan 161 kV	91	128E	.031	McCredie-Montgomery 345 kV McCredie-Overton 345 kV
		1400		Muskogee-Clarksville 345 kV	804	895E	.064	Riverside Station-Muskogee 345 kV
		1500*		No Additional Limit Found				Each Valid Contingency Tested

Transfer direction with subscript ‘x’ includes uncommitted resources in the exporing 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	400	<= (R)	Ft. Smith 500/161 kV Tr.	459	473E	.036	Ft. Smith 345/161 kV Tr.
		1000	(12A)	Maries 138/161 kV Tr	60	100E	.039	Bland-Franks 345 kV
		1000		Danville-Magazine 161 kV	115	148E	.031	Ft. Smith-ANO 500 kV
		1500*		No Additional Limit Found				Each Valid Contingency Tested
AMRNx	IITC	1500*		No Limit Found				None
	FCITC	400	<= (R)	Ft. Smith 500/161 kV Tr.	459	473E	.037	Ft. Smith 345/161 kV Tr.
		1000		Danville-Magazine 161 kV	115	148E	.032	Ft. Smith-ANO 500 kV
		1200	(12A)	Maries 138/161 kV Tr.	60	100E	.034	Bland-Franks 345 kV
		1500*		No Additional Limit Found				Each Valid Contingency Tested
SPP-N	IITC	1200*		No Limit Found				None
	FCITC	1100	(65A,R)	Lawrence Hill 230/115 kV Tr.	265	300E	.031	Lawrence Hill-Midland 230 kV
		1200*	<=	No Additional Limit Found				Each Valid Contingency Tested

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

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 Guide
(23) Boswell Emergency Operating Guide
(44) Taconite-Harbor Emergency Operating Guide
(65) Lawrence Hill Operating Guide

DESCRIPTION OF OPERATING GUIDES/PROCEDURES

Arpin Area Operating Guide (ATCllc) (rev March 2001)

The completion of the Baldwin-Marathon City project (Pine Lake-Cassel 115 kV rebuild) by June 1, 2001 will require modification of the existing Arpin Operating Guide. Modification of the guide is required to fully realize the benefits of the upgraded NSP-ATCLLC interconnection at the T-Corners 115 kV substation. It is anticipated that maintaining the T-Corners interconnection during an outage of the 345 kV line will improve the post-contingency phase angle separation across the 345 kV system. The Arpin Operating guide, which removes limitations on lower voltage facilities during an outage of King-Eau Clarie-Arpin 345 kV or Arpin-Rocky Run 345 kV line, is currently under inter-regional review by those transmission entities affected by the guide.

Although not in its final form, the Arpin operating guide included within this study includes two portions to remove limits on lower voltage 115 kV facilities which parallel the King-Eau Claire-Arpin-Rocky Run 345 kV line.

Part I: For an outage of the King-Eau Claire-Arpin or the Eau Claire-Arpin 345 kV line, this study maintained the interconnection at T Corners (the T Corners-Wien 115 kV line) and simulated the automatic opening of the Arpin-Hume 115 kV line to remove overloads on the 115 kV system between Wien and Arpin.

Part II: For an outage of the Arpin-Rocky Run 345 kV line, this study maintained the T Corners interconnection, simulated the automatic opening of the Port Edwards-Sand Lake and Port Edwards- Saratoga 138 kV lines to remove overloads on the 138 kV system between Arpin and Port Edwards, and simulated the opening of the Arpin-Hume 115 kV line to remove overloads on the 115 kV system between Arpin and Wien.

Arpin Area Operating Guide (ALTE & WPS)
(Guide as used in past studies)

The Arpin area operating guide consists of opening substation breakers to prevent transmission lines from overloading during specific transmission line outages or overload conditions. The Arpin area operating guide is described as three separate parts. All parts of the Arpin area operating guide are required for this seasonal transmission assessment study.

Part I: The first part of the Arpin area operating guide consists of opening a 115 kV breaker at the T Corners substation to prevent the Wissota - T Corners - Wien 115 kV line from overloading. The Wissota - T Corners - Wien 115 kV line is most susceptible to overloading for the outage of any portion of the King - Eau Claire - Arpin 345 kV line. The T Corners 115 kV breaker will operate automatically for an overload of the T Corners - Wien 115 kV when the flow is from T Corners to Wien.

Part II: The second part of the Arpin area operating guide consists of opening 138 kV breakers at the Port Edwards substation on the Port Edwards - Wautoma and Port Edwards - Saratoga 138 kV lines to prevent the Arpin - Sigel 138 kV line from overloading. This portion of the guide also requires the operation of a 46 kV breaker at the West Wisconsin Rapids substation to open the West Wisconsin Rapids - Water Quality 46 kV line. The Arpin - Sigel 138 kV line is most

susceptible to overloading for the Arpin - Rocky Run 345 kV line outage. These breakers will open automatically for an overload of the Arpin - Sigel 138 kV line.

Part III: The third part of the Arpin area operating guide consists of opening a 115 kV breaker at the Sherman Street substation on the Sherman Street - Cassel 115 kV line to prevent an overload of the Wien - Cassel 115 kV line. The Wien - Cassel 115 kV line is most susceptible to overloads for the outage of the Arpin - Rocky Run 345 kV line. The 115 kV breaker at Sherman Street will open automatically for an overload of the Wien - Cassel 115 kV line.

Boswell Emergency Operating Guide (MP)

MAPP systems do not implement operating procedures for the purpose of increasing nonemergency transfers. However, if a situation exists where a utility requires emergency import, the MAPP 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.

If one of the three Boswell 230 kV transmission outlets trip, or becomes out of service, Boswell generation at Units #3 and #4 will be reduced to be within the guidelines for operation on two outlets. The Boswell Operating Guide consists of reducing generation at Boswell until the Boswell 230 kV transmission outlets are loaded at or below their respective emergency rating.

All Boswell generation limits are based on either Summer or Winter emergency thermal MVA ratings. The actual Boswell generation limit depends upon Manitoba Hydro to U.S. transfer level, International Falls phase shifter flow, Boswell 115 kV generation and line conductor temperature. Since the Manitoba - Minnesota 500 kV transmission upgrade, Boswell generation is not limited transiently. Boswell generation can exceed these limits up to a level at which a thermal line limit is reached.

Taconite Harbor Emergency Operating Guide (MP) prior to 2004 summer

MAPP systems do not implement operating procedures for the purpose of increasing nonemergency transfers. However, if a situation exists where a utility requires emergency import, the MAPP 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. Minnesota Power has an automatic tripping scheme that would open the Taconite Harbor 138/115 kV transformer, for overloads on any of the series elements between Laskin and Colby 115 kV substations. This is done based on about 90% of the emergency rating of the above circuits. Load shedding is also available at the Hoyt Lake Plant as well as generation adjustment.

Taconite Harbor Special Protection System (MP)

MAPP systems do not implement operating procedures for the purpose of increasing nonemergency transfers. However, if a situation exists where a utility requires emergency import, the MAPP 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.

Lawrence Hill 230/115 kV Transformer Operating Guide (WR)

The loss of the Midland Junction 230/115 kV transformer during peak load conditions will result in an over load of the Lawrence Hill 230/115 kV transformer. The guide calls for opening the Midland Junction 161/115 kV transformer by opening Midland Junction 115-164 (Midland Junction – Tonga Tap 115 kV). If the Lawrence Hill 230/115 kV transformer still exceeds its acceptable limit after opening the Midland Junction 161/115 kV transformer, the Generation System Operator will lower generation at either Lawrence Energy Center and/or Tecumseh Energy Center until the load level on the Lawrence transformer is within acceptable limits. An outage of the Lawrence Hill-Midland Junction 230 kV line may also result in an overload on the Lawrence Hill 230/115 kV transformer. The guide calls for opening the Midland Junction 161/115 kV transformer by opening Midland Junction 115-164 (Midland – Tonga Tap 115 kV). If the Lawrence Hill 230/115 kV transformer still exceeds its acceptable limit, the Midland Junction breaker 115-164 (Midland - Pentagon 115kV) will be opened. If the transformer still exceeds its acceptable limit after opening the Midland Junction 161/115 kV transformer, the Generation System Operator will lower generation at either Lawrence Energy Center and/or Tecumseh Energy Center until the load level on the Lawrence transformer is within acceptable limits.

Basecase Schedules for 2004 Summer Peak

FROM Region	Co.	TO Region	Co.	MW Interchange 2004 S	2003 S
ERCOT	DC TIE	SPP	AEPW	170	159
	ERCOT to SPP Net			170	159
MAIN	AMRN	SPP	SPA	-16	-16
MAIN	CWL	SPP	KACY	-20	-20
MAIN	CWL	SPP	SPA	-79	-79
	MAIN to SPP Net			-115	-115
MAPP	NPPD	SPP	MPS	100	90
MAPP	WAPA	SPP	SECI	4	4
	MAPP TO SPP Net			104	94
SERC	AECI	SPP	SPA	-528	-528
SERC	AECI	SPP	AEPW	38	40
SERC	AECI	SPP	GRDA	-238	-254
SERC	AECI	SPP	WR	40	40
SERC	AECI	SPP	MIPU	38	0
SERC	AECI	SPP	KACP	150	150
SERC	EES	SPP	CELE	23	23
SERC	EES	SPP	LEPA	-3	-3
SERC	EES	SPP	SPA	356	354
SERC	EES	SPP	AEPW	32	101
SERC	EES	SPP	OKGE	0	-10
SERC	LAGN	SPP	CELE	104	102
SERC	LAGN	SPP	SPA	-91	-90
SERC	LAGN	SPP	AEPW	115	113
	SERCW TO SPP Net			36	38
WSCC	BLKW	SPP	SPS	-200	-200
WSCC	EDDY	SPP	SPS	-200	-200
	WSCC to SPP Net			-400	-400