Southwest Power Pool

Impact Study for Transmission Service Request #174276&174277 6/1/00 – 9/1/00 Ameren to Western Resources Co.

Southwest Power Pool
Transmission Reliability Assessment
May, 2000

Description of Request

This Impact Study is in response to OASIS request #174276 and #174277 by Western Resources. This request is for a transfer of up to 100 MW of Firm Point-to-Point Transmission Service to be supplied by SPP from Ameren to Western Resources. The request is for service from 6/1/00 to 9/1/00. The Fort Smith 500/161 kV transformer has been identified as a constraint upon the outage of the Fort Smith 500/345 kV transformer. These facilities are owned by OG+E who has put its facilities under the SPP Regional Tariff. The Impact Study identifies switching, redispatch, or firm reservations that, if curtailed, would affect or relieve the transmission constraint.

Summary

Southwest Power Pool (SPP) has studied multiple system reconfigurations in past Impact Studies as an option to relieve overloading of the Fort Smith 500/161 kV transformer upon the outage of the 500/345 kV transformer and determined that a system reconfiguration did not exist which would relieve the overload. OG+E was contacted to verify that the constraint is valid.

Redispatch options for this overload were evaluated to determine which units, if redispatched, could unload the facilities. SPP determined that redispatch solutions do not exist in SPP and between SPP and Entergy.

SPP reviewed the existing firm reservations under the SPP Tariff and tariffs of transmission providers that signed the Agency Agreement. No existing firm reservations existed which could be curtailed to relieve the transmission constraint pursuant to the SPP Tariff guidelines.

SPP denies the request based on the study information.

Redispatch Procedures

The 2000 Southwest Power Pool (SPP) Summer Peak model completed in January of 2000, was used for the study. This model was updated to reflect current circumstances.

The SPP used the NERC Generator Sensitivity Factor (GSF) Viewer and the MUST program to obtain possible unit pairings, which would relieve the constraint. The GSF viewer calculates unit impacts on monitored facilities for all units above 20 MW in the Eastern Interconnection. The Fort Smith 500/161 kV transformer is included in this list as a monitored facility. The MUST program was also used to find unit impacts on the constraint in the 2000 Southwest Power Pool (SPP) Summer Peak model. Unit pairings were formed based on generation shift factors, which would unload the transformer.

Redispatch Study Results

NERC calculates shift factors on specified facilities for all generation units over 20 MW in the Eastern Interconnection. NERC also provides a list of the Top 100 Relief Pairs. These generation shift factors were reviewed for impacts on the Fort Smith transformer as a starting point for redispatch assessment. Numerous SPP generators were available with significant negative impacts which would reduce transformer flows when unit output is increased. However, none of the units with a positive impact (increasing flows when unit output is increased or reducing flow when unit output is reduced) were in the SPP area. Only units east of Fort Smith (outside of SPP) have positive impact factors. Consequently, the only redispatch options within the SPP are between units with relatively different negative impacts on the constraint. Such a pairing has less redispatch leverage than a pairing of units having positive impacts with units having negative impacts.

The best possible redispatch options to relieve the overload exist between SPP and Entergy. NERC produces a list of the Top 100 Relief Pairs for a monitored flowgate. **Table 1** contains NERC's Top 100 Relief Pairs for the Fort Smith Flowgate. The tabulated DC analysis provides a multitude of market redispatch options. Although, the availability of such redispatches is dependent upon the present generation schedules of the units being considered.

The other possible option is to consider two units with relatively different negative impacts on the constraint. By decreasing generation on a unit with a smaller negative impact, compared to the unit on which generation is increased, the net effect of redispatch is a reduction in flows on a monitored facility. **Table 2** contains the list of SPP units with negative shift factors. Again, the availability of such redispatches is dependent upon the present generation schedules of the units being considered.

The distribution factor on the Fort Smith transformer for an Ameren to Western Resources response on the Fort Smith transformer is 6.6%. A redispatch would be required to relieve the 6.6MW transfer impact on the constraint under emergency conditions. Redispatch would only occur during heavy loading of the 500/161 kV transformer and with the loss of the Fort Smith 500/345 kV transformer. The loss of the 500/345 kV transformer by itself does not necessarily require redispatch.

To verify the availability of any possible redispatch, the 2000 Summer Peak Model was used to examine the participation of the units listed in **Table 1** and **Table 2.** The availability of non-base load units was reviewed. It was determined that no significant redispatch would be available during the transaction period.

Table 1. NERC's Top 100 Relief Pairs.

Source	Sink	GSF Factor	Source	Sink	GSF Factor
OKGE_AES 1G 13.8	EES_1ANO U122.0	-50.8	SPA_RSK3&4 113.8	EES_1BLAK U213.2	-38.5
OKGE_AES 1G 13.8	EES_1ANO U222.0	-50.8	SPA_RSK3&4 113.8	EES_1BLAK U213.2	-38.5
OKGE_AES 2G 13.8	EES_1ANO U122.0	-50.8	SPA_EUF #2 113.8	EES_1ANO U122.0	-38.3
OKGE_AES 2G 13.8	EES_1ANO U222.0	-50.8	SPA_EUF #2 113.8	EES_1ANO U222.0	-38.3
SPA_RSK1&2 113.8	EES_1ANO U122.0	-46	SPA_EUF #3 113.8	EES_1ANO U122.0	-38.3
SPA_RSK1&2 113.8	EES_1ANO U122.0	-46	SPA_EUF #3 113.8	EES_1ANO U222.0	-38.3
SPA_RSK1&2 113.8	EES_1ANO U222.0	-46	SPA_RSK1&2 113.8	EES_1CARP U113.8	-38.1
SPA_RSK1&2 113.8	EES_1ANO U222.0	-46	SPA_RSK1&2 113.8	EES_1CARP U113.8	-38.1
SPA_RSK3&4 113.8	EES_1ANO U122.0	-46	SPA_RSK1&2 113.8	EES_1CARP U213.8	-38.1
SPA_RSK3&4 113.8	EES_1ANO U122.0	-46	SPA_RSK1&2 113.8	EES_1CARP U213.8	-38.1
SPA_RSK3&4 113.8	EES_1ANO U222.0	-46	SPA_RSK1&2 113.8	EES_1L&D #9 6.90	-38.1
SPA_RSK3&4 113.8	EES_1ANO U222.0	-46	SPA_RSK1&2 113.8	EES_1L&D #9 6.90	-38.1
OKGE_AES 1G 13.8	EES_1MURY U16.90	-44.4	SPA_RSK3&4 113.8	EES_1CARP U113.8	-38.1
OKGE_AES 2G 13.8	EES_1MURY U16.90	-44.4	SPA_RSK3&4 113.8	EES_1CARP U113.8	-38.1
OKGE_AES 1G 13.8	EES_1BLUF U122.0	-43.9	SPA_RSK3&4 113.8	EES_1CARP U213.8	-38.1
OKGE_AES 1G 13.8	EES_1BLUF U222.0	-43.9	SPA_RSK3&4 113.8	EES_1CARP U213.8	-38.1
OKGE_AES 2G 13.8	EES_1BLUF U122.0	-43.9	SPA_RSK3&4 113.8	EES_1L&D #9 6.90	-38.1
OKGE_AES 2G 13.8	EES_1BLUF U222.0	-43.9	SPA_RSK3&4 113.8	EES_1L&D #9 6.90	-38.1
OKGE_AES 1G 13.8	EES_1BLAK U113.2	-43.3	CSWS_OZARK S269.0	EES_1MURY U16.90	-34.4
OKGE_AES 1G 13.8	EES_1BLAK U213.2	-43.3	CSWS_OZARK S269.0	EES_1BLUF U122.0	-33.9
OKGE_AES 2G 13.8	EES_1BLAK U113.2	-43.3	CSWS_OZARK S269.0	EES_1BLUF U222.0	-33.9
OKGE_AES 2G 13.8	EES_1BLAK U213.2	-43.3	CSWS_OZARK S269.0	EES_1BLAK U113.2	-33.3
OKGE_AES 1G 13.8	EES_1CARP U113.8	-42.9	CSWS_OZARK S269.0	EES_1BLAK U213.2	-33.3
OKGE_AES 1G 13.8	EES_1CARP U213.8	-42.9	CSWS_OZARK S269.0	EES_1CARP U113.8	-32.9
OKGE_AES 1G 13.8	EES_1L&D #9 6.90	-42.9	CSWS_OZARK S269.0	EES_1CARP U213.8	-32.9
OKGE_AES 2G 13.8	EES_1CARP U113.8	-42.9	CSWS_OZARK S269.0	EES_1L&D #9 6.90	-32.9
OKGE_AES 2G 13.8	EES_1CARP U213.8	-42.9	SPA_EUF #1 113.8	EES_1MURY U16.90	-32.7
OKGE_AES 2G 13.8	EES_1L&D #9 6.90	-42.9	SPA_EUF #1 113.8	EES_1BLUF U122.0	-32.2
CSWS_OZARK S269.0	EES_1ANO U122.0	-40.8	SPA_EUF #1 113.8	EES_1BLUF U222.0	-32.2
CSWS_OZARK S269.0	EES_1ANO U222.0	-40.8	SPA_EUF #2 113.8	EES_1MURY U16.90	-31.9
SPA_RSK1&2 113.8	EES_1MURY U16.90	-39.6	SPA_EUF #3 113.8	EES_1MURY U16.90	-31.9
SPA_RSK1&2 113.8	EES_1MURY U16.90	-39.6	SPA_EUF #1 113.8	EES_1BLAK U113.2	-31.6
SPA_RSK3&4 113.8	EES_1MURY U16.90	-39.6	SPA_EUF #1 113.8	EES_1BLAK U213.2	-31.6
SPA_RSK3&4 113.8	EES_1MURY U16.90	-39.6	SPA_EUF #2 113.8	EES_1BLUF U122.0	-31.4
SPA_EUF #1 113.8	EES_1ANO U122.0	-39.1	SPA_EUF #2 113.8	EES_1BLUF U222.0	-31.4
SPA_EUF #1 113.8	EES_1ANO U222.0	-39.1	SPA_EUF #3 113.8	EES_1BLUF U122.0	-31.4
SPA_RSK1&2 113.8	EES_1BLUF U122.0	-39.1	SPA_EUF #3 113.8	EES_1BLUF U222.0	-31.4
SPA_RSK1&2 113.8	EES_1BLUF U122.0	-39.1	SPA_EUF #1 113.8	EES_1CARP U113.8	-31.2
SPA_RSK1&2 113.8	EES_1BLUF U222.0	-39.1	SPA_EUF #1 113.8	EES_1CARP U213.8	-31.2
SPA_RSK1&2 113.8	EES_1BLUF U222.0	-39.1	SPA_EUF #1 113.8	EES_1L&D #9 6.90	-31.2
SPA_RSK3&4 113.8	EES_1BLUF U122.0	-39.1	SPA_EUF #2 113.8	EES_1BLAK U113.2	-30.8
SPA_RSK3&4 113.8	EES_1BLUF U122.0	-39.1	SPA_EUF #2 113.8	EES_1BLAK U213.2	-30.8
SPA_RSK3&4 113.8	EES_1BLUF U222.0	-39.1	SPA_EUF #3 113.8	EES_1BLAK U113.2	-30.8
SPA_RSK3&4 113.8	EES_1BLUF U222.0	-39.1	SPA_EUF #3 113.8	EES_1BLAK U213.2	-30.8
SPA_RSK1&2 113.8	EES_1BLAK U113.2	-38.5	SPA_EUF #2 113.8	EES_1CARP U113.8	-30.4
SPA_RSK1&2 113.8	EES_1BLAK U113.2	-38.5	SPA_EUF #2 113.8	EES_1CARP U213.8	-30.4
SPA_RSK1&2 113.8	EES_1BLAK U213.2	-38.5	SPA_EUF #2 113.8	EES_1L&D #9 6.90	-30.4
SPA_RSK1&2 113.8	EES_1BLAK U213.2	-38.5	SPA_EUF #3 113.8	EES_1CARP U113.8	-30.4

SPA_RSK3&4 113.8	EES_1BLAK U113.2	-38.5	SPA_EUF #3 113.8	EES_1CARP U213.8	-30.4
SPA_RSK3&4 113.8	EES_1BLAK U113.2	-38.5	SPA_EUF #3 113.8	EES_1L&D #9 6.90	-30.4

Table 2. Selected SPP Generator Shift Factors.

Source	Sink	GSF Factor	Source	Sink	GSF Factor	Source	Sink	GSF Factor
OKGE_AES 1G 13.8	Swing	-37.9	OKGE_ SONR1G22.0	Swing	-12.9	SPA_STK #1 113.8	Swing	-8.4
OKGE_AES 2G 13.8	Swing	-37.9	WFEC_MORLND2 18.0	Swing	-12.9	SPA_TBR1&2 113.8	Swing	-8.3
SPA_RSK1&2 113.8	Swing	-33.1	OKGE_ SONR2G20.0	Swing	-12.8	SPA_TBR1&2 113.8	Swing	-8.3
SPA_RSK1&2 113.8	Swing	-33.1	SPS_CUNN1 113.8	Swing	-12.5	SPA_TBR3&4 113.8	Swing	-8.3
SPA_RSK3&4 113.8	Swing	-33.1	SPS_JONES1 122.0	Swing	-12.5	SPA_TBR3&4 113.8	Swing	-8.3
SPA_RSK3&4 113.8	Swing	-33.1	SPS_JONES2 121.0	Swing	-12.5	WPEK_JUD-LRG113.8	Swing	-8.3
CSWS_OZARK S269.0	Swing	-27.9	SPS_LP-HOLL269.0	Swing	-12.5	WR_JEC U1 26.0	Swing	-8.2
SPA_EUF #1 113.8	Swing	-26.2	SPS_MADDX1 113.8	Swing	-12.5	WR_JEC U2 26.0	Swing	-8.2
SPA_EUF #2 113.8	Swing	-25.4	SPS_MUSTG#1113.8	Swing	-12.5	WR_JEC U3 26.0	Swing	-8.2
SPA_EUF #3 113.8	Swing	-25.4	SPS_MUSTG#2113.8	Swing	-12.5	WR_TEC U7 14.4	Swing	-8.2
OKGE_ MSKG4G18.0	Swing	-20.6	SPS_MUSTG#3122.0	Swing	-12.5	WR_TEC U8 16.0	Swing	-8.2
OKGE_ MSKG5G18.0	Swing	-20.6	SPS_PLANT X113.8	Swing	-12.5	SPA_BBOW#1 113.8	Swing	-8.1
OKGE_ MSKG6G24.0	Swing	-20.6	SPS_TOLK 124.0	Swing	-12.5	SPA_BBOW#2 113.8	Swing	-8.1
CSWS_RSS1-1 24.0	Swing	-17.8	SPS_TOLK 124.0	Swing	-12.5	WR_LEC U3 14.4	Swing	-8.1
CSWS_RSS2-1 22.0	Swing	-17.8	SPS_HARRNG 124.0	Swing	-12.3	SPA_TRU123 113.8	Swing	-6.6
CSWS_TPS4-1 13.8	Swing	-17.6	SPS_HARRNG 124.0	Swing	-12.3	SPA_TRU456 113.8	Swing	-6.6
GRDA_BOOMER 269.0	Swing	-16.9	SPS_NICHOL 113.8	Swing	-12.3	SPA_TRU456 113.8	Swing	-6.6
SPA_KEY1&2 113.8	Swing	-16.9	EDE_R7G167 113.2	Swing	-12.2	SPA_BSH #1 113.8	Swing	-4.7
SPA_KEY1&2 113.8	Swing	-16.9	SPS_BLKHK1 113.8	Swing	-12.2	SPA_BSH #2 113.8	Swing	-4.7
GRDA_GRDA15-122.8	Swing	-16.7	SPS_BLKHK2 113.8	Swing	-12.2	SPA_BSH3&4 113.8	Swing	-4.7
GRDA_SALINA 5 161	Swing	-16.6	EDE_S1G439 113.2	Swing	-12.1	SPA_BSH3&4 113.8	Swing	-4.7
GRDA_SALINA 5 161	Swing	-16.6	EDE_A1G349 113.8	Swing	-11.5	SPA_BSH5&6 113.8	Swing	-4.7
CSWS_NES2-1 22.0	Swing	-16.2	SPA_BVR #1 113.8	Swing	-11.2	SPA_BSH5&6 113.8	Swing	-4.7
CSWS_NES4-1 22.0	Swing	-16.1	SPA_BVR #2 113.8	Swing	-11.2	SPA_BSH7&8 113.8	Swing	-4.7
GRDA_GRDA17-122.8	Swing	-16	SPA_CARTHG 269.0	Swing	-10.9	SPA_BSH7&8 113.8	Swing	-4.7
GRDA_PENSA 269.0	Swing	-15.6	EDE_L1G382 113.2	Swing	-10.5	SPA_DAR1&2 113.8	Swing	-3.7
CSWS_FLINTCR121.0	Swing	-14.3	WR_GETTY 269.0	Swing	-10.4	SPA_DAR1&2 113.8	Swing	-3.7
OKGE_ SCI 1G13.8	Swing	-13.3	WR_WCGS U1 25.0	Swing	-9.8	SPA_DAR3&4 113.8	Swing	-3.7
OKGE_ SEMN2G17.1	Swing	-13.2	WFEC_HUGO1 23.4	Swing	-9.3	SPA_NFK #1 113.8	Swing	-2.9
WFEC_ANADRK4 13.8	Swing	-13.2	SPA_SWPS#1 120.0	Swing	-9.1	SPA_NFK #2 113.8	Swing	-2.9
WFEC_ANADRK5 13.8	Swing	-13.2	SPA_JRPS#3 113.8	Swing	-9	CSWS_WELSH2-118.0	Swing	-2.1
WFEC_ANADRK6 13.8	Swing	-13.2	SPA_JRPS#4 113.8	Swing	-9	CSWS_WILKE3-122.0	Swing	-1
CSWS_COM1-1 13.8	Swing	-13.1	SPA_JRPS#5 113.8	Swing	-9	CSWS_KNOXL5-121.0	Swing	-0.9
CSWS_SWS3-1 24.0	Swing	-13.1						