

SYSTEM IMPACT STUDY

900MW Generation Facility in KCPL Control Area



Executive Summary

Customer has requested a System Impact Study to evaluate a proposal to add 900MW of generation in northern Platte County, MO. This study is a continuation of the original Feasibility Study made in April 2001 to study the impact of a 700-1100MW unit at that site. The unit is expected to be operational in summer 2005. The request was made on June 4, 2001.

Customer has proposed the addition of 900MW of coal-fired generation at the site. The unit will be interconnected to the KCPL 345kV transmission system at the Iatan substation. This study is based on the 2005 summer and winter peak models and the 2006 summer peak model. The 2005 cases were derived from the 2004 summer and winter peak cases with additional transfers and newly proposed generation included for the summer of 2005. Single contingency outages were applied to the base case model without the proposed generation facilities to identify any pre-existing constraints. The proposed generation was then added to the models to determine any further transmission constraints.

The analysis identifies interconnection facility requirements and addresses the transmission impacts of the new generation on the system. In addition, a short circuit analysis was performed to identify bus fault values that exceed equipment ratings and a transient stability study was conducted to verify stable operation of the network following disturbances on the system.

The interconnection facility requirements include expansion of the Iatan 345kV bus and installation of six new 345kV circuit breakers. This expansion would provide terminals for the unit and start/standby transformers and a line terminal position for a new Iatan-Nashua 345kV circuit necessary for the generation interconnection. The cost of the interconnection facilities is estimated to be \$24,459,000 plus 25-30% CIAC adders. The projected in-service date for the Customer interconnection facilities is July 1, 2005.

Additional system improvements are required to alleviate the contingency overloading on the 345kV and 161kV transmission system that results from the additional generation. A new 345/161kV transformer installation at Nashua in conjunction with the proposed Iatan-Nashua 345kV circuit eliminates the contingency overloading of the Iatan-St. Joe 345kV circuit and Iatan-Stranger Creek 345kV circuit. In 2006, upgrade of the Craig-College 161kV circuit is needed to avoid overloading the circuit during contingency outages. The estimated cost of system improvements is \$4,160,000 plus 25-30% CIAC adders.

Short circuit analysis was performed to determine the increase in fault current levels at various 345kV and 161kV buses on the KCPL and adjacent transmission systems. The investigation identified no improvements that are required because of increased fault levels resulting from the proposed generation. Circuit breaker replacement is

presently planned for locations where pre-existing fault levels exceed equipment rating limits.

Transient stability analysis indicates that for more probable disturbances with normal fault clearing times, system stability is maintained. With the occurrence of a less probable, extreme fault condition at the Iatan bus, in which fault clearing is delayed due to stuck breaker conditions, the Iatan and Customer units are unstable. The units are expected to trip for the out-of-synchronism condition. The remaining units remain stable provided the lost generation is replaced by import power and curtailment of transactions. Equipment at the Iatan substation is equipped with independent pole tripping to reduce the likelihood of delayed clearing of the three-phase fault condition. New equipment for the interconnection facilities should include similar operational capability, and out-of-step relaying is recommended for equipment protection.

1. Introduction

1.1 Project Description

This System Impact Study was conducted at the request of Customer to evaluate the installation of a 900MW coal-fired generation unit at Customer's site adjacent to the Iatan 345kV substation in northern Platte County, MO. A Feasibility Study requested on Feb 22, 2001 was completed on April 30, 2001. The request for a detailed System Impact Study was made on June 4, 2001.

Customer is currently considering a proposal to install a 900MW generating unit in the KCPL control area as a merchant plant. The system interconnection is to be made to the 345kV transmission system at the Iatan substation. For analysis purposes, the market for the new generation is the Entergy control area and is identified as the sink for the generation. This study determines the transmission constraints that are caused by the added generation.

1.2 Study Methodology

The System Impact Study investigates the effect of new generation on system performance during normal and contingency conditions. Comparison of the base case, which excludes the proposed facilities, to the study case, which includes the proposed Customer unit, reveals any system constraints that result from the proposed generation. The analysis cases are based on the 2004 summer peak, 2004 winter peak and 2006 summer peak models provided by the Southwest Power Pool (SPP) to address the seasonal loading conditions of the system. In the 2004 summer and winter models, modifications were made to reflect system changes for the 2005 in-service year and up to 952MW of available IPP generation on the KCPL system. The 2006 summer model includes all 952MW of IPP generation proposed on the KCPL system. Additional transfers to and from SPP control areas are included as indicated in Table 1, and the proposed plant is modeled at maximum output of 900MW for all study cases.

The proposed plant is to be located in the Kansas City Power & Light (KCPL) control area and specific unit dispatch is modeled within the KCPL system in the analysis models. The available generation in the Entergy control area, used as the sink for the generation study, is scaled to accommodate the 900MW transfer. Table 2 lists the proposed plant output level and amount of the transfer between the KCPL and Entergy control areas for all seasonal cases.

The normal operating conditions for the study are established by performing a load flow analysis with all lines in service. Full AC contingency analysis is used to investigate the limiting constraints of the transmission system during contingency events. Comparisons are made between the cases with and without the Customer generation in service in order to identify the severity and cause of the overloading conditions. All branches in the KCPL and surrounding control areas above 100kV and

all ties with KCPL are monitored for overloads exceeding 100% of normal rating. Buses are monitored for voltage deviations exceeding +/- 5% of nominal.

Table 1 –Customer Plant Output and Transfer Levels			
Seasonal generation levels and transfers to Entergy (EES) control area (MW)			
	Plant Output	Transfer to Sink	Control Area Total Generation
Summer 2005	900	900	22,391
Winter 2005	900	900	16,113
Summer 2006	900	900	22,006

1.3 Plant Details and Modeling

The proposed site is to be located adjacent to the Iatan power generating plant, and the unit will be connected to the Iatan 345kV bus. The plant facilities include a 900MW unit and auxiliary plant load as shown in Appendix B. The gross unit output is expected to be 900MW with plant load estimated to be 40MW. The peak output is used in all study cases to assess the impact of the generation on the transmission system although market conditions will determine the output level.

Changes to the seasonal load flow models have been included in this analysis for improvements in progress or planned for service in the study years. The projects include circuit reconductoring and equipment upgrades that increase the capability of the transmission system, and a list of these improvements is included below with the planned in-service year.

- Stilwell-Antioch 161kV line rebuild 2003
- Antioch-Oxford 161kV line rebuild 2003
- Paola-S. Ottawa 161kV line improvements 2004
- Paola-Centennial 161kV equipment upgrade 2005
- Wagstaff-Centennial 161kV equipment upgrade 2005
- W. Gardner-S. Ottawa 161kV equipment upgrade 2005

2. Analysis

2.1 2005 Summer Peak

The 2005 summer peak study case consists of the 2004 base case model with modifications that include all system improvements scheduled for the 2005 summer season. For the purpose of this study, the sink for the proposed generation is the Entergy control area and the 2005 summer load forecast for the area is 24,290MW. The base case analysis includes the scheduled generation and transfers including 952MW of IPP generation that is proposed for 2005. The study case includes 900MW additional generation from the proposed plant with transfers from the KCPL area to the Entergy control area. Table 2 lists the specific generation dispatch in the KCPL control area and all net transfers to other control areas.

Table 2 – Generation Dispatch and Area Interchange Schedule					
Comparison of base case and proposed 900MW Customer plant addition for 2005 summer peak					
GENERATION DISPATCH (for KCPL control area)			INTERCHANGE		
Plant/Unit	Base	Study	Area	Base	Study
	w/o Customer plant	w/ Customer plant			
Hawthorn 5	560	560	EES	0	900
Hawthorn 6	120	120	AECI	-150	-150
Hawthorn 7	0	0	SWPA	-5	-5
Hawthorn 8	0	0	GRRD	-15	-15
Hawthorn 9	119	119	WERE	141	141
Montrose #1	170	170	MIPU	123	123
Montrose #2	164	164	KACY	35	35
Montrose #3	133	155	EMDE	80	80
LaCygne#1	688	688	INDN	112	112
LaCygne#2	674	674	SPRM	51	51
Iatan#1	670	670	STJO	121	121
Northeast N.	0	0			
Northeast S.	0	0			
Grand Ave	0	0			
Gardner	2	2			
Higginsville	34	34			
IPP #1	400	400			
IPP #2	552	552			
Proposed	0	900			

Added generation at the Customer facility results in no base case overloads on the transmission system. However, overloading occurs as a result of outages of several transmission facilities. In some cases pre-existing overloads are reduced or eliminated by the generation additions. The most critical 345kV system constraints are

summarized in Table 3 with a comparison of conditions before and after the 900MW generation addition at the proposed plant.

Table 3 - 2005 summer peak - Significant 345kV overloaded facilities		
Normal and contingency flows with and without the proposed 900MW Customer generation		
Monitored line----normal -----contingency	Base Case W/o Cust.	Analysis Base Case w/ Cust.
LaCygne-Stilwell(normal) – rating:1099MVA	1099	1021
Jeffrey EC-Morris out	1107	-
Lang-Swissvale out	1122	-
Lang-Wichita out	1131	-
Stranger Creek transformer out	1111	-
Stillwell-Swissvale out	1121	-
Benton-Wolf Creek out	1172	1115
Neosho-LaCygne out	1161	1155
Rosehill-Wolf Creek out	1164	1108
Auburn-Jeffrey EC out	1115	-
Lawrence Hill - Lawr EC out	1133	-
W. Gardner transformer #11 out	1143	-
W. Gardner-Craig out	1451	1319
IPP#2-W. Gardner out	1782	1621
St. Joe-Hawthorn out	1115	-
Craig transformer#11 or #22 out	1127	-
Craig transformer #33 out	1118	-
LaCygne-IPP#2 out	1403	1247
St. Joe latan out	1145	1121
W. Gardner-Craig (normal) – rating:1099MVA	771	628
LaCygne-Stilwell out	1304	1123
Stilwell transformer #11 (normal) – rating: 550MVA	368	352
Stilwell transfomer #22 out	564	-
W. Gardner transformer #11 – rating:400MVA	206	218
W. Gardner-Craig out	484	446
IPP#2-W. Gardner(normal) – rating:1099MVA	972	844
Hoyt-Jeffrey EC out	1112	-
Lacygne-Stilwell out	1641	1466
Craig transformer #33 (normal) - rating: 400MVA	275	303
Craig transformer#11 or #22 out	-	425

Table 3 (cont'd) - 2005 summer peak - Significant 345kV overloaded facilities		
Normal and contingency flows with and without the proposed 900MW Customer generation		
Monitored line----normal -----contingency	Base Case W/o Cust	Analysis Base Case w/ Cust
latan-Stranger Creek(normal) - rating: 1099MVA	235	621
latan-St. Joe out	-	1569
latan -St. Joe (normal) - rating: 956MVA	547	944
Jeffrey EC-Morris out	-	966
Stranger Creek Transformer out	-	998
LaCygne-Stilwell out	-	994
Stilwell-Pleasant Hill out	-	988
Craig-Stranger Creek out	-	1123
latan-Stranger Creek out	-	1524
Pleasant Hill-Sibley out	-	978

With the Jeffrey EC-Morris 345kV circuit out of service, the latan-St. Joe 345kV line reaches 101% of capability. Loss of the Stranger Creek transformer results in loading of the latan-St. Joe 345kV line to 104% of capability. An outage on the LaCygne-Stilwell 345kV circuit results in increased loading of the Craig-Lenexa 161kV line (109%), and causes the overloading of the Greenwood-Lenexa 161kV line (104%) and the latan-St. Joe 345kV line (104%). An outage on the Stilwell-Pleasant Hill 345kV circuit results in overloading on the latan-St. Joe 345kV line (103%).

The loading on the latan-St. Joe to reaches 117% for an outage on the Stranger Creek-Craig 345kV line and 159% for an outage on the Stranger Creek-latan 345kV line. An outage of the St. Joe-latan 345kV line causes overloading of the latan-Stranger Creek 345kV line (143%). Loss of the Pleasant Hill-Sibley 345kV circuit results in the loading of the latan-St. Joe line to 102%. Loss of the Craig #11 345/161kV transformer causes the loading of the Craig #22 345/161kV transformer to reach 102% and the Craig #33 345/161kV transformer to reach 106%, while loss of the Craig #22 transformer causes the loading of the Craig #11 transformer to reach 102% and the Craig #33 transformer to reach 106%.

In addition, contingency overloads occur on the 161kV system. With the Craig #33 transformer out of service, the Greenwood-Lenexa 161kV circuit reaches 108% and the Craig-Lenexa 161kV circuit reaches 114% of capability. An outage on the Craig-Cedar Creek 161kV circuit causes the Craig-Lenexa 161kV line to reach 110% of capability and the Greenwood-Lenexa 161kV line to reach 105%. With the Pflumm-Overland Park 161kV circuit out of service, the loading on the Craig-Lenexa line reaches 112% and the Greenwood-Lenexa line reaches 106%. Loss of the St. Joe-latan 345kV line results in

overloads on the Greenwood-Lenexa 161kV line (112%), the Craig-Lenexa 161kV line (118%).

Loss of the Southtown-Forest 161kV line causes the loading on the Merriam-Roe Park 161kV circuit to reach 109% of capability, while loss of the Greenwood-Cedar Creek 161kV line results in overloading on the Craig-Lenexa 161kV line (108%) and the Greenwood-Lenexa line (102%).

In the Missouri Public Service area the loss of the Salisbury-Norton 161kV circuit causes loading of the Windsor-Clinton 161kV circuit to increase to 111%. Loading of the Harrisonville 161/69kV transformer reaches 107% for an outage of the Archie-Adrian line, 103% for an outage of the Nevada-Butler line, 106% for an outage of the Butler-Adrian or the Montrose-Clinton circuit. Loss of the Warrensburg-Odesa line results in the loading of Windsor-Clinton 161kV circuit to 107%.

Proposed Facilities

The combined output of 1570MW from the Customer and the Iatan #1 plants will be injected into the grid at the Iatan substation. Presently, the Iatan-St. Joe 345kV line and the Iatan-Stranger Creek 345kV line exit the Iatan substation. The Iatan-St. Joe circuit is rated at 956MVA and is loaded to 99% of capability under normal base case operating conditions with the additional generation. The Iatan-Stranger Creek 345kV line is rated at 1099MVA and is loaded to 57% of capability under normal operating conditions. Loss of either line results in overloading of the remaining circuit. The Iatan-St. Joe line is particularly susceptible to overloading by a number of contingencies because of the limited capability. A third 345kV circuit exiting the Iatan substation is required to inject the proposed plant's output into the grid and will be included as part of the direct-assignment interconnection facilities. The new circuit would carry 43% of the combined plant output under normal conditions and would alleviate the overloading of the Iatan-St. Joe line and the Iatan-Stranger Creek line during contingency events. The estimated cost of the interconnection facilities including the Iatan-Nashua 345kV circuit and 345kV terminal positions is \$24,459,000. Table 10 lists the details and estimated costs for the interconnection and direct-assignment facilities.

The 161kV transmission lines that deliver power from the 345/161kV interface at Craig substation experience contingency overloading as well. Analysis indicates that the third circuit from Iatan should be tied into the Hawthorn-St. Joe 345kV line at Nashua. A Nashua 345/161kV transformer eliminates the overloads at Craig and reduces the loading on the Nashua-Hawthorn 345kV line. This transformer and associated substation construction will be included as part of the system improvements. The estimated cost of the system upgrades necessary to alleviate contingency overloads on transmission facilities is \$4,160,000. Table 12 contains estimated costs for the Nashua transformer and other necessary system improvements.

Pre-existing overloads on the transmission facilities in the KCPL area are under study to identify possible remedies. The additional generation at the Iatan substation

and additional transmission improvements redirect power flows on the 161kV system, resulting in relief from contingency overloading. In the Missouri Public Service territory contingency overloads of facilities require further investigation to determine the best methods for removing these constraints. The loading on the Harrisonville 161/69kV transformer and the Windsor-Clinton 161kV circuit exceed the normal ratings on these facilities during contingency outages. Upgrades to the transmission system may be required in that area to eliminate the overload conditions.

2.2 2005 Winter Peak

For the purpose of this impact study, the 2005 winter peak output of the Customer unit is 900MW. The winter peak case addresses moderate loading conditions on transmission facilities. The sink for the 900MW Customer generation is the Entergy control area and an inter-area transfer of 900MW is included for this transaction. The 2005 winter load forecast for the Entergy area is 18,228MW. The 2005 Winter Peak study includes generation from other IPP sources that has been scaled to 374MW for winter levels. Table 5 lists the generation dispatch for the KCPL area and all net transfers to the other affected control areas.

Table 4 – Generation Dispatch and Area Interchange Schedule
 Comparison of base case and proposed Customer plant addition for 2005 winter peak

GENERATION DISPATCH(for KCPL control area)			INTERCHANGE		
Plant/Unit	Base	Study	Area	Base	Study
	w/o Customer plant	w/ Customer plant			
Hawthorn 5	560	560	EES	0	900
Hawthorn 6	0	0	AECI	0	0
Hawthorn 7	0	0	SWPA	-5	-5
Hawthorn 8	0	0	GRRD	-10	-10
Hawthorn 9	0	0	MIDW	0	0
Montrose #1	100	100	WERE	137	137
Montrose #2	0	0	MIPU	76	76
Montrose #3	80	119	KACY	19	19
LaCygne#1	650	650	EMDE	80	80
LaCygne#2	674	674	INDN	97	97
Iatan#1	670	670	SPRM	51	51
Northeast N.	0	0	STJO	121	121
Northeast S.	0	0			
Grand Ave	0	0			
Gardner	0	0			
Higginsville	0	0			
IPP #1	0	0			
IPP #2	374	374			
Proposed Customer	0	900			

The contingency analysis indicates overloading conditions for the two existing latan 345kV circuits during several facility outages. Table 6 details these contingencies as well as other overloaded 345kV transmission lines.

Loss of the Craig-Stranger Creek 345kV line causes the loading of the latan-St. Joe line to reach 118% of capability. With the latan-Stranger Creek 345kV circuit out of service, the latan-St. Joe 345kV line is forced to carry the combined plant output from latan and the Customer plant, and the loading reaches 160% of capability. An outage on the Stranger Creek 345/161kV transformer, the LaCygne-Stilwell 345kV line, the Stilwell-Pleasant Hill 345kV line, or the Platte City-Stranger Creek 161kV line results in loading of the latan-St. Joe circuit to 102%. Loss of the latan-St. Joe 345kV circuit causes loading of the latan-Stranger Creek 345kV circuit to reach 130% of capability.

Table 5 - 2005 winter peak - Significant 345kV overloaded facilities		
Normal and contingency flows with and without the proposed 900MW Customer generation		
Monitored line----normal -----contingency	Base Case W/o Cust	Analysis Base Case w/ Cust
latan-St. Joe (normal) - rating: 956MVA	540	932
Craig-Stranger Creek out	-	1127
latan-Stranger Creek out	-	1526
Stranger Creek transformer out	-	974
Lacygne-Stilwell out	-	973
Stilwell-Pleasant Hill out	-	974
latan-Stranger Creek (normal) – rating: 1195MVA	168	613
latan-St. Joe out	-	1549

Proposed Facilities

Under normal base case conditions the latan-St. Joe line carries 60% of the generation from the latan and Customer plants and is loaded to 98% of capability with the additional generation. The latan-Stranger Creek carries 40% of the latan/Customer plant output and is loaded to 56% of capability under normal conditions. A new line from latan to Nashua and 345/161kV transformer at Nashua redistributes the power flow from latan and removes the contingency constraints imposed by the limited capability of the two existing circuits from latan. Under normal operating conditions, the new line would carry 43% of the plant output from the Customer and latan #1 units. Under 345kV contingency outages, the new circuit allows the plant output to flow through an alternate delivery path and eliminates the overloading of the latan circuits.

2.3 2006 Summer Peak

The 2006 Summer Peak base case includes 952MW of IPP generation and all system improvements planned for service by 2006. For the study case the Customer plant output is expected to be 900MW and the Entergy control area is the assumed sink for the proposed generation. The load forecast for the sink area is estimated to be 24,321MW. The generation dispatch and area interchange schedules are included in Table 6 below:

Table 6 – Generation Dispatch and Area Interchange Schedule					
Comparison of base case and proposed Customer plant addition for 2006 summer peak					
GENERATION DISPATCH (for KCPL control area)			INTERCHANGE		
Plant/Unit	Base	Study	Area	Base	Study
	w/o Customer plant	w/ Customer plant			
Hawthorn 5	560	560	EES	0	900
Hawthorn 6	141	141	AECI	0	0
Hawthorn 7	55	55	SWPA	-5	-5
Hawthorn 8	77	77	GRRD	-15	-15
Hawthorn 9	140	140	MIDW	0	0
Montrose #1	170	170	WERE	141	141
Montrose #2	164	164	MIPU	128	128
Montrose #3	152	127	KACY	29	29
LaCygne#1	688	688	EMDE	80	80
LaCygne#2	674	674	INDN	112	112
Iatan#1	670	670	SPRM	51	51
Northeast N.	0	0	STJO	121	121
Northeast S.	0	0			
Grand Ave	0	0			
Gardner	0	0			
Higginsville	34	34			
IPP #1	400	400			
IPP #2	552	552			
Proposed Customer	0	900			

The addition of Customer's generation results in no base case overloads but does result in contingency overloading on the 345kV and 161kV transmission system. Several 345kV circuits exhibit pre-existing overloads during contingency outages and the additional generation alters the power flow patterns reducing the pre-existing overloaded conditions in some cases. Table 7 contains a summary of significant 345kV facility overloads and compares the base case loading with the result of the proposed Customer generation.

An outage of the Stranger Creek-Craig 345kV circuit results in overloads of the Iatan-St. Joe 345kV line to 114% of capability. With the Iatan-Stranger Creek 345kV

circuit out of service, the loading of the Iatan-St. Joe 345kV line reaches 160%. Loss of the Iatan-St. Joe 345kV line causes the Iatan-Stranger Creek 345kV line to reach 143%.

Loss of the LaCygne-Stilwell 345kV line causes the Craig-Lenexa 161kV circuit to reach 105% of capability. With the Stilwell-Antioch 161kV line out of service, the Craig-College line loading reaches 103%. An outage of the Craig-Pflumm 161kV line results in overloads of the Craig-Lenexa 161kV line (110%) and the Greenwood-Lenexa 161kV line (104%). Loss of the Iatan-St. Joe 345kV line causes the Craig-Lenexa line to reach 112% and the Greenwood-Lenexa 161kV line to reach 106%.

Table 7 - 2006 summer peak - Significant 345kV overloaded facilities

Normal and contingency flows with and without the proposed 900MW Customer generation

Monitored line----normal -----contingency	Base Case W/o Cust.	Analysis Base Case w/ Cust.
LaCygne-Stilwell(normal) – rating:1099MVA	1027	973
Benton-Wolf Creek out	1119	-
Neosho-LaCygne out	1133	1132
Rosehill-Wolf Creek out	1111	-
W. Gardner-Craig out	1380	1252
IPP#2-W. Gardner out	1704	1546
LaCygne-IPP#2 out	1328	1176
Iatan-St. Joe (normal) -- rating:956MVA	475	897
Craig-Stranger Creek out	-	1092
Iatan-Stranger Creek out	-	1525
W. Gardner-Craig (normal) – rating:1099MVA	739	590
LaCygne-Stilwell out	1244	-
W. Gardner transformer #11 – rating:400MVA	210	225
W. Gardner-Craig out	478	440
IPP#2-W. Gardner(normal) – rating:1099MVA	945	814
Lacygne-Stilwell out	1579	1404
Craig transformer #33 (normal) - rating: 400MVA	271	302
Craig transformer#11 or #22 out	-	424

With the Craig #11 transformer out of service, the Craig #22 345/161kV transformer becomes loaded to 102% and the Craig #33 345/161kV transformer loading reaches 106%. Loss of the Craig #22 345/161kV transformer results in overloads on the Craig

#11 345/161kV transformer (102%) and the Craig #33 345/161kV transformer (106%). With the Craig-Cedar Creek 161kV circuit out of service loading of the Craig-Lenexa 161kV line reaches 106%. An outage of the Pflumm-Overland Park 161kV circuit causes the Greenwood-Lenexa line to reach 102% of capability and the Craig-Lenexa line to reach 108% of capability. Loss of the Greenwood-Cedar Creek 161kV line results in overload of the Craig-Lenexa 161kV circuit (108%).

In the Missouri Public Service area, loss of the Iatan-St. Joe 345kV circuit causes the Windsor Clinton line loading to reach 104%. The loss of the Sibley-Orrick 161kV line or Richmond-Orrick 161kV line causes the Windsor Clinton line to become overloaded (102%). Loss of the Oak Grove-Odesa 161kV circuit causes the Windsor-Clinton Line to reach 105%. An outage of the Warrensburg-Whiteman AFB 161kV circuit causes loading of the Windsor-Clinton line to reach 104% and loss of the Thomas Hill-Salisbury 161kV line causes the loading of the Windsor-Clinton 161kV line to reach 104%. With the Salisbury-Norton line out of service the Windsor-Clinton 161kV circuit reaches 120% of capability. Loss of Blue Springs-Oak Grove 161kV circuit causes the Windsor-Clinton line to reach 108%. Loss of the Archie-Adrian circuit results in overloads of the Harrisonville 161/69kV transformer (106%) and the Montrose-Clinton 161kV line (101%). An outage of the Nevada-Butler 161kV line causes overloads of the Harrisonville 161/69kV transformer (101%) and the Butler 161/69kV transformer (105%). Loss of the Butler-Adrian 161kV line causes the loading of the Harrisonville 161/69kV transformer to reach 104%.

Loss of the Frost Road-KC South 161kV circuit causes the Prairie Lee-Blue Springs circuit to reach 103% of capability, and with the Longview-KC South circuit out of service, the loading of the Prairie Lee-Blue Springs circuit reaches 108%. An outage of the Warrensburg-Odesa 161kV circuit causes the loading of the Windsor-Clinton 161kV line to reach 119%. Loss of the Clinton-Montrose 161kV line causes overloading of the Harrisonville 161/69kV transformer (105%) and the Butler 161/69kV transformer (105%).

Proposed Facilities

During 2006 summer peak conditions, the normal base case loading of the Iatan-St. Joe line carries 57% of the combined plant output from the Iatan #1 and the Customer units. The Iatan-Stranger Creek line carries the remaining 43% of the power. Construction of an Iatan-Nashua 345kV circuit for the interconnection provides an alternate path for power flow during contingency outages of the Iatan circuits. Combined with a 345/161kV transformer at Nashua, it will divert 42% of the total generation and reduce the loading of the Iatan-St. Joe circuit to 35% and the Iatan-Stranger Creek to 23% of the total. Additional improvements would be needed to increase the rating of the Craig-College 161kV line. Reconductoring of the existing 2.3-mi. circuit with 1192kcmil ACSS/TW conductor increases the circuit capability and prevents the overloading during the Stilwell-Antioch contingency.

The system improvements remove the overloads on the 345/161kV interface from the Craig substation, and reduce loading of the LaCygne-Stilwell and LaCygne-W. Gardner transmission paths. Further analysis of the contingency overloading of the Windsor-Clinton line and the Butler transformers in the Missouri Public Service territory is needed to determine the best remedy for the problem.

2.4 Short Circuit Analysis

A short circuit study has been conducted to determine if fault current levels exceed equipment ratings at KCPL facilities. The results of the analysis indicate that the addition of the Customer generation does not raise the fault levels appreciably with the exception of the Nashua substation bus. However, the maximum fault current is within the ratings of the equipment. In some locations equipment replacement has been planned where excessive fault current levels exist prior to Customer’s proposed addition. The analysis includes the impact on selected buses in the St. Joe Light & Power, Missouri Public Service, and Western Resources territories. Table 8 below compares the fault current levels before and after the generation and lists the interrupting ratings for equipment in the KCPL area.

Table 8 - Short circuit analysis results comparing fault current before and after the addition of the Customer plant

Facility	After/Before Ratio	Fault Current	Equipment Rating
W. Gardner (345 KV)	1.011	3Ø – 15,532.3	40 KA
		1Ø – 11,642.9	
W. Gardner (161 KV)	1.004	3Ø – 15,032.9	40 KA
		1Ø – 13,475.7	
Hawthorn (345 KV)	1.012	3Ø – 21,014.4	40 KA
		1Ø – 20,747.1	
Hawthorn (3 - 345kV Xfmr In Service) (161 KV)	1.019	3Ø – 58,236.3	63 KA
	1.014	1Ø – 63,748.4	
Hawthorn (2 - 345kV Xfmr In Service) (161 KV)	1.019	3Ø – 56,901.9	63 KA
	1.014	1Ø – 61,959.8	
Nashua (New Substation) (345 KV)		3Ø – 11,286.0	
		1Ø – 8,966.6	
Nashua	1.366	3Ø – 26,262.6	3Ø – 31,259

(161 KV)	1.487	1Ø – 19,512.8	1Ø – 34,385
Craig (345 KV)	1.023	3Ø – 17,925.5	40 KA
		1Ø – 14,109.3	
Craig (161 KV)	1.013	3Ø – 37,038.1	40 KA
		1Ø – 29,535.7	Except R5-6
Comments: Scheduled To Be Changed			3Ø – 31,259
			1Ø – 34,385
Table 8 (cont'd) - Short circuit analysis results			
Facility	After/Before Ratio	Fault Current	Equipment Rating
LaCygne (345 KV)	1.003	3Ø – 25,483.3	40 KA Min.
	1.002	1Ø – 28,791.1	
Iatan (345 KV)	1.357	3Ø – 22,991.6	40 KA
	1.524	1Ø – 24,853.3	
Avondale (161 KV)	1.033	3Ø – 30,182.9	40 KA Min.
		1Ø – 24,679.8	Except R2-15
comments: No Change Out Required			3Ø – 31,259
			1Ø – 34,385
Gladstone (161 KV)	1.064	3Ø – 18,161.9	3Ø – 10,940
		1Ø – 11,852.4	1Ø – 12,035
comments: Scheduled To Be Changed Presently	Line Out Condition	3Ø – 12,161.9	
		1Ø – 7,991.8	
Weatherby (161 KV)	1.064	3Ø – 14,817.4	3Ø – 10,940
	1.068	1Ø – 9,988.5	1Ø – 12,035
comments: No Change Out Required	Line Out Condition	3Ø – 8,774.3	
		1Ø – 7,370.2	
Line Creek (161 KV)	1.055	3Ø – 16,381.0	3Ø – 31,259
	1.061	1Ø – 10,535.0	1Ø – 34,385
Shoal Creek (161 KV)	1.108	3Ø – 16,863.9	3Ø – 31,259
	1.114	1Ø – 10,750.3	1Ø – 34,385
St Joe (345 KV)	1.060	3Ø – 17,287.4	
		1Ø – 12,480.5	
St Joe (161 KV)	1.011	3Ø – 6,874.0	
	1.007	1Ø – 8,507.1	
Hoyt (345 KV)	1.022	3Ø – 15,021.5	
		1Ø – 11,887.7	

Stranger Creek (345 KV)	1.114	3Ø – 20,674.9	
		1Ø – 16,866.8	
Stranger Creek (161 KV)	1.020	3Ø – 13,037.1	
	1.021	1Ø – 12,921.0	

Table 8 (cont'd) - Short circuit analysis results

Facility	After/Before Ratio	Fault Current	Equipment Rating
Lake Road (161 KV)	1.017	3Ø – 7,994.8	
	1.013	1Ø – 10,691.7	
Smithville (161 KV)	1.245	3Ø – 19,682.9	
	1.309	1Ø – 13,838.4	
Roanridge (161 KV)	1.139	3Ø – 20,801.8	
	1.158	1Ø – 13,758.2	
Liberty West (161 KV)	1.137	3Ø – 15,321.9	
	1.158	1Ø – 10,354.2	

2.5 Transient Stability Analysis

Transient Stability analysis was performed to verify dynamic system response to disturbances on the system using the 2005 summer and 2005 winter peak models. The machine data was obtained from the current SPP dynamics data files with additional data for plants proposed for the study period. Selected fault scenarios were applied with clearing times specified in accordance with KCPL Planning Criteria. Single phase and three phase fault conditions were tested at the interconnection point and machines in the KCPL were monitored for stability. Analysis of stuck breaker events was included to examine the effects of extreme disturbances. The study results are detailed in a separate report.

The study indicates that while single-phase and three-phase fault events do not cause system instability, a less probable, extreme disturbance involving a stuck breaker with delayed clearing of a three-phase fault, the Iatan and Customer units become unstable. Out-of-synchronism relaying would trip the units offline and the remainder of the system would remain stable with import power replacing lost generation. Oscillations are generally damped following the fault clearing. However, the delayed

clearing of a single pole following the attempted clearing of the three-phase fault results in sustained oscillations of nearby machines indicating poor damping and possible need for control system tuning. The use of Independent pole tripping at the latan substation reduces the likelihood of the three-phase delayed clearing condition and is recommended, in addition to out-of-step relaying for generator protection during the extreme disturbance events. Table 9 below summarizes the results of the transient stability study.

Table 9 - Summary of simulation results		
	Study Case	
	2005 Summer	2005 Winter
Event Description		
Case #1 - Three-phase fault on the latan-St. Joe 345kV circuit at the latan end. Normal clearing in 3.6 cy.	Stable	Stable
Case #2 - Single-phase fault on the latan-St. Joe 345kV circuit at the latan end. Normal clearing in 3.6 cy.	Stable	Stable
Case #3 - Three-phase fault on the latan-St. Joe 345kV circuit at the latan end. Delayed clearing of one pole. Backup clearing in 10.8 cy.	Stable	Stable
Case #4 - Three-phase fault on the latan-St. Joe 345kV circuit at the latan end. Delayed clearing of all phases. Backup clearing in 10.8 cy.	latan and Customer units unstable	latan and Customer units unstable
Case #4b - Three-phase fault on the latan-St. Joe 345kV circuit at the latan end. Delayed clearing of all phases. Backup clearing in 10.8 cy. Tripping of latan, Customer plant for loss of synchronism and replacement of lost generation by net import	latan and Customer units tripped offline, system stable	latan and Customer units tripped offline, system stable

3. Interconnection Facilities

The Customer plant will be interconnected with the 345kV transmission system at the Iatan substation in northern Platte County, MO. The existing 345kV bus will be expanded to accommodate the new generating unit and two (2) unit auxiliary transformers. Seven (7) 345kV circuit breakers will be added to accommodate the new unit and additional 345kV line terminal for the proposed Iatan-Nashua line. The new Iatan-Nashua line is necessary to relieve the contingency overloads on the existing circuits at the point of the interconnection due to the increased generation.

The preliminary cost estimates for the facilities are listed in Table 10 below. The amount does not include any additional charges of approximately 25-30% resulting from contribution in aid to construction (CIAC) fees that are to be paid by the requestor. The construction of the interconnection facilities is expected to last 20 months for the station work once zoning and construction permits have been obtained. The planning and construction of the Iatan-Nashua transmission line is expected to last 43 months including the route selection and right-of-way acquisition issues. The estimated project schedule is included in Tables 11a and 11b.

Table 10 – Summary of Estimated Project Component Costs for Interconnection

** Costs do not include any adders for CIAC*

Item	Description	Cost
1	Iatan substation facilities and equipment	\$5,304,000
2	New Iatan-Nashua line (27.5 mi.)	\$14,987,000
3	Nashua substation work	\$4,168,000
	Total Project Cost	\$24,459,000*

Table 11a – Project Schedule for Interconnection Station Work

Project timeline does not include zoning and construction permits

Task	Description of Work	Start	End
1	Evaluation and budgetary approvals	11/1/03	12/31/03
2	Initial engineering	1/1/04	7/2/04
3	Materials ordering & procurement	3/1/04	2/4/05
4	Final engineering & design	8/30/04	10/22/04
5	Foundation, structural work	11/1/04	1/14/05
6	Transmission line & terminal work	1/17/05	3/4/05
7	Equipment, relay, metering installation	9/1/04	5/13/05
8	Testing and inspection	5/1/05	6/30/05
	Total Project Completion	11/1/03	7/1/05

Table 11b – Project Schedule for Interconnection Transmission Work

Task	Description of Work	Start	End
1	Route Selection, Right-of-way Acquisition	12/1/01	6/30/03
2	Engineering & Design	4/1/03	7/31/03
3	Material Procurement, Construction	8/1/03	7/1/05
	Total Project Completion	12/1/01	7/1/05

4. System Improvements

In addition to the facilities needed to connect the proposed Customer plant to the transmission system, upgrades are required to alleviate contingency overloading on area transmission facilities. A 550MVA 345/161kV transformer installation provides a new 345/161kV interface that allows the transfer of power from the new Iatan-Nashua 345kV circuit to the 161kV system in the northern KCPL territory. Rebuild of the Craig-College 161kV line with 1192kcmil ACSS/TW conductor is needed to eliminate the contingency overloading that occurs in the 2006 study case. Table 12 lists the estimated cost for the Iatan-Nashua system improvements needed to relieve contingency overloading on the system.

Table 12 – Recommended System Improvements for the Customer generation (900MW)	
<i>* Costs do not include any adders for CIAC</i>	
Description	Cost
Nashua 345kV transformer and associated equipment	\$3,760,000
Craig-College 161kV circuit reconductor (2.3mi.)	\$400,000
Total System Improvements Cost	\$4,160,000*

5. Conclusion

This System Impact Study was requested by Customer to assess transmission capacity with the addition of 900MW of new generation in northern Platte County, MO. The analysis evaluates the impact of introducing the new generation on the power system during normal operation and contingency conditions.

The addition of 900MW generating capacity at the proposed site results in the overloading of transmission facilities during outages on the 345kV and 161kV system. The existing circuits from the Iatan substation are inadequate for the additional capacity of the plant, and a new Iatan-Nashua 345kV line is required for the plant interconnection to allow the transfer of power from the Iatan site under contingency conditions.

Facility upgrades are required at the Iatan substation to accommodate the proposed plant. Expansion of the 345kV ring bus and installation of six (6) 345kV circuit breakers is necessary for the new unit terminal and proposed Iatan-Nashua 345kV circuit. Land acquisition and environmental impact issues are not included in the cost of constructing interconnection facilities. The cost for the interconnection facilities, including the proposed Iatan-Nashua circuit, is estimated to be \$24,459,000 less CIAC adders. The project timeline is approximately 20 months for the station construction provided any zoning and permitting issues are resolved. The Iatan-Nashua transmission line project timeline is approximately 43 months including route selection, right-of-way acquisition, engineering and construction. Planning and construction of the interconnection facilities would begin on December 1, 2001 with an anticipated service date of July 1, 2005.

System improvements are needed to alleviate overloading of transmission facilities during contingency outages. Installation of a 345kV/161kV transformer at Nashua provides a new 345/161kV interface on the eastern side of the system and assists in relieving the overloads on the KCPL 161kV system due to contingency events. Rebuild of the 2.3-mi. Craig-College 161kV circuit with 1192kcmil ACSS/TW conductor would increase the rating of the line beyond the contingency loading levels. The estimated cost for the system improvements is \$4,160,000.

Branch Violations

Table C-1 2005 Summer Base Case vs Customer 900MW generation

*** MUST 4.00 *** THU, JUL 05 2001 7:38 ***
 1-2001 SOUTHWEST POWER POOL POWER FLOW MODEL
 2004 SUMMER PEAK (04SP) BASE CASE

start: 8:21:07 AM
 end: 8:21:30 AM
 elapsed: 0:00:23

Notes:

04 Summer Base Case vs Customer with 900MW generation

*****Comparison of Base case flows to Contingency flows*****

Contingency	Monitored Element	Rating	Base Case		Study Case	
			Normal	Contingency Flow % of Rating	Normal	Contingency Flow % of Rating
56765 HOYT 7 345 56766 JEC N 7 345 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR 57965 W.GRDNR7 345 58105 IPP#2 345 1 LN	280.0 1099.0	238.0 972.0	281.5 1112.4	100.5 101.2	230.0 844.0
56766 JEC N 7 345 56770 MORRIS 7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN 57982 IATAN 7 345 69702 ST JOE 3 345 1 LN	1099.0 956.0	1099.0 547.0	1106.6 1021.0	100.7 944.0	1021.0 966.4 101.1
56769 LANG 7 345 56774 SWISVAL7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1121.5	102.0	1021.0
56769 LANG 7 345 56796 WICHITA7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1131.2	102.9	1021.0
56772 STRANGR7 345 59231 STRANGR5 161 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN 57982 IATAN 7 345 69702 ST JOE 3 345 1 LN	1099.0 956.0	1099.0 547.0	1110.6 1021.0	101.1 944.0	1021.0 997.7 104.4
56774 SWISVAL7 345 57968 STILWEL7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1120.6	102.0	1021.0
56791 BENTON 7 345 56797 WOLFCRK7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1171.7	106.6	1021.0 1115.2 101.5
56793 NEOSHO 7 345 57981 LACYGNE7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1160.8	105.6	1021.0 1154.8 105.1
56794 ROSEHIL7 345 56797 WOLFCRK7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1163.9	105.9	1021.0 1107.5 100.8
56851 AUBURN 6 230 56852 JEC 6 230 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1115.4	101.5	1021.0
56853 LAWHILL6 230 56854 LEC U5 6 230 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1132.9	103.1	1021.0
56853 LAWHILL6 230 56855 MIDLAND6 230 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	238.0	357.3	127.6	230.0 345.6 123.4
57965 W.GRDNR7 345 57966 WGARDNR5 161 11	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1143.1	104.0	1021.0
57965 W.GRDNR7 345 57977 CRAIG 7 345 1	57969 STILWEL5 161 58057 BUCYRUS5 161 1 LN 57969 STILWEL5 161 58053 REDEL 5 161 1 LN 58037 OLATHEW5 161 58043 MURLEN 5 161 1 LN 57965 W.GRDNR7 345 57966 WGARDNR5 161 11 TR	224.0 293.0 293.0 400.0	183.0 271.0 120.0 206.0	229.0 313.7 339.2 484.4	102.2 107.1 115.8 121.1	168.0 264.0 117.0 218.0 297.2 101.4 294.7 100.6 446.1 111.5

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					57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1450.7	132.0	1021.0	1319.7	120.1		
					58043	MURLEN	5	161	58044	MOONLT	5	161	1	LN	293.0	177.0	397.1	135.5	175.0	352.7	120.4
					57966	WGARDNR5	161	58044	MOONLT	5	161	1	LN	293.0	218.0	435.4	148.6	216.0	391.1	133.5	
57965	W.GRDNR7	345	58105	IPP#2	345	1															
					58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	87.0	100.9	100.9	79.0			
					57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	317.0	108.2	264.0	302.2	103.1	
					57993	STHTOWN5	161	59210	MARTCTY5	161	1	LN	224.0	161.0	244.9	109.3	137.0				
					58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	293.0	156.0	357.7	122.1	117.0			
					57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1781.8	162.1	1021.0	1620.5	147.5		
57966	WGARDNR5	161	58044	MOONLT	5	161	1														
					57968	STILWEL7	345	57969	STILWEL5	161	11	TR	550.0	368.0	563.5	102.5	352.0				
57968	STILWEL7	345	57981	LACYGNE7	345	1															
					58067	CENTENL5	161	58068	WAGSTAF5	161	1	LN	293.0	215.0	300.1	102.4	200.0				
					57966	WGARDNR5	161	58044	MOONLT	5	161	1	LN	293.0	218.0	304.4	103.9	216.0	296.6	101.2	
					57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	240.0	309.0	105.5	256.0	320.6	109.4	
					58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	293.0	243.0	328.8	112.2	227.0	307.5	105.0	
					57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	224.0	183.0	264.4	118.0	168.0	243.2	108.6		
					57965	W.GRDNR7	345	57977	CRAIG	7	345	1	LN	1099.0	771.0	1304.3	118.7	628.0	1122.6	102.1	
					57965	W.GRDNR7	345	58105	IPP#2	345	1	LN	1099.0	972.0	1641.0	149.3	844.0	1465.6	133.4		
					58031	GRNWOOD5	161	58039	LENEXAN5	161	1	LN	293.0	223.0			238.0	304.0	103.8		
					57982	IATAN	7	345	69702	ST JOE	3	345	1	LN	956.0	547.0			944.0	993.9	104.0
57968	STILWEL7	345	59200	PHILL	7	345	1														
					59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.3	102.6	49.0	51.1	102.1	
					58002	MARTCIT5	161	58053	REDEL	5	161	1	LN	293.0	233.0	318.9	108.8	226.0	311.5	106.3	
					57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	353.1	120.5	264.0	345.8	118.0	
					57982	IATAN	7	345	69702	ST JOE	3	345	1	LN	956.0	547.0			944.0	988.2	103.4
57969	STILWEL5	161	57994	HICKMAN5	161	1															
					58002	MARTCIT5	161	58053	REDEL	5	161	1	LN	293.0	233.0	295.1	100.7	226.0			
					59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.5	101.0	49.0			
					57993	STHTOWN5	161	59210	MARTCTY5	161	1	LN	224.0	161.0	233.2	104.1	137.0				
					57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	329.9	112.6	264.0	318.3	108.6	
57969	STILWEL5	161	58050	ANTIOCH5	161	1															
					59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.6	101.1	49.0	50.2	100.5	
					57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	316.7	108.1	264.0	301.9	103.0	
57969	STILWEL5	161	58053	REDEL	5	161	1														
					59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.5	105.0	49.0	52.2	104.3	
57969	STILWEL5	161	58057	BUCYRUS5	161	1															
					57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1149.6	104.6	1021.0				
69702	ST JOE	3	345	57972	HAWTH	7	345	1													
					57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1115.3	101.5	1021.0				
57973	HAWTHRN5	161	57976	LEVEE	5	161	1														
					57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	246.0	301.9	103.0	232.0				
					57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	211.0	314.3	107.3	198.0	294.7	100.6		
57973	HAWTHRN5	161	58011	CHOUTEU5	161	1															
					57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	246.0	297.9	101.7	232.0				
					57973	HAWTHRN5	161	57976	LEVEE	5	161	1	LN	293.0	218.0	321.5	109.7	204.0	301.2	102.8	
					57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	218.0	321.7	109.8	204.0	301.4	102.9
57973	HAWTHRN5	161	58027	RANDLPH5	161	1															
					57973	HAWTHRN5	161	57976	LEVEE	5	161	1	LN	293.0	218.0	307.3	104.9	204.0			

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					57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	218.0	307.4	104.9	204.0			
57976	LEVEE	5	161	57985	NEAST	5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	246.0	301.9	103.0	232.0	
					57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	211.0	314.4	107.3	198.0	294.8	100.6			
57977	CRAIG	7	345	57978	CRAIG	5	161	11	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1127.1	102.6	1021.0	
					57977	CRAIG	7	345	57978	CRAIG	5	161	22	TR	550.0	363.0			399.0	559.7	101.8	
					57977	CRAIG	7	345	57978	CRAIG	5	161	33	TR	400.0	275.0			303.0	425.0	106.3	
57977	CRAIG	7	345	57978	CRAIG	5	161	22	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1126.8	102.5	1021.0	
					57977	CRAIG	7	345	57978	CRAIG	5	161	11	TR	550.0	366.0			403.0	562.7	102.3	
					57977	CRAIG	7	345	57978	CRAIG	5	161	33	TR	400.0	275.0			303.0	423.5	105.9	
57977	CRAIG	7	345	57978	CRAIG	5	161	33	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1118.4	101.8	1021.0	
57978	CRAIG	5	161	57979	PFLUMM	5	161	1	58031	GRNWOOD5	161	58039	LENEXAN5	161	1	LN	293.0	223.0	294.6	100.5	238.0	315.7
					57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1115.5	101.5	1021.0					
					57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	240.0	311.3	106.3	256.0	332.5	113.5		
57978	CRAIG	5	161	58038	LENEXAS5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1108.8	100.9	1021.0	
57978	CRAIG	5	161	58039	LENEXAN5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1110.3	101.0	1021.0	
57978	CRAIG	5	161	58048	COLLEGE5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1107.8	100.8	1021.0	
57978	CRAIG	5	161	58049	CEDRCRK5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1104.3	100.5	1021.0	
					57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	240.0	304.2	103.8	256.0	323.5	110.4		
					58031	GRNWOOD5	161	58039	LENEXAN5	161	1	LN	293.0	223.0			238.0	306.9	104.7			
57979	PFLUMM	5	161	58047	OVERLPK5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1114.1	101.4	1021.0	
					57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	240.0	305.4	104.2	256.0	326.6	111.5		
					58031	GRNWOOD5	161	58039	LENEXAN5	161	1	LN	293.0	223.0			238.0	309.8	105.7			
57981	LACYGNE7	345	58105	IPP#2	345	1			57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1402.5	127.6	1021.0	1247.4
69702	ST JOE	3	345	57982	IATAN	7	345	1	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1144.5	104.1	1021.0	1120.5
					58031	GRNWOOD5	161	58039	LENEXAN5	161	1	LN	293.0	223.0			238.0	327.7	111.8			
					57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	240.0			256.0	344.4	117.5		
					56772	STRANGR7	345	57982	IATAN	7	345	1	LN	1099.0	235.0			621.0	1569.0	142.8		
57985	NEAST	5	161	58011	CHOUTEU5	161	1		57973	HAWTHRN5	161	57976	LEVEE	5	161	1	LN	293.0	218.0	310.6	106.0	204.0
					57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	218.0	310.8	106.1	204.0			
57993	STHTOWN5	161	57994	HICKMAN5	161	1			59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.7	49.0
					57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	312.9	106.8	264.0	301.3	102.8		
57993	STHTOWN5	161	58001	FOREST	5	161	1		58032	MERRIAM5	161	58040	ROEPARK5	161	1	LN	187.0	80.0	190.1	101.7	104.0	203.0
57999	LVISTAW5	161	58013	HARSNVL5	161	1			59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.2	100.5	49.0
58002	MARTCIT5	161	58053	REDEL	5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.1	104.2	49.0
																					51.8	103.6

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58002	MARTCIT5	161	59210	MARTCTY5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.7	103.4	49.0	51.4	102.7	
58015	AVONDAL5	161	58027	RANDLPH5	161	1	57973	HAWTHRN5	161	57976	LEVVEE	5	161	1	LN	293.0	218.0	299.3	102.2	204.0			
							57976	LEVVEE	5	161	57985	NEAST	5	161	1	LN	293.0	218.0	299.5	102.2	204.0		
58031	GRNWOOD5	161	58039	LENEXAN5	161	1	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1109.5	101.0	1021.0				
58031	GRNWOOD5	161	58049	CEDRCRK5	161	1	57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	240.0	297.0	101.4	256.0	316.3	108.0	
							58031	GRNWOOD5	161	58039	LENEXAN5	161	1	LN	293.0	223.0			238.0	299.7	102.3		
58032	MERRIAM5	161	58040	ROEPARK5	161	1	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1104.5	100.5	1021.0				
58034	KNLWRTH5	161	58052	REEDER	5	161	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1105.6	100.6	1021.0				
58036	OLATHEE5	161	58046	OXFORD	5	161	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.6	49.0			
							57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	297.5	101.5	264.0			
58037	OLATHEW5	161	58043	MURLEN	5	161	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1120.8	102.0	1021.0				
58038	LENEXAS5	161	58052	REEDER	5	161	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1106.8	100.7	1021.0				
58043	MURLEN	5	161	58044	MOONLT	5	161	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1131.5	103.0	1021.0			
58046	OXFORD	5	161	58050	ANTIOCH5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.5	101.0	49.0		
							57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	310.7	106.0	264.0	295.9	101.0	
58057	BUCYRUS5	161	58068	WAGSTAF5	161	1	58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	57.0	180.4	103.7	43.0				
							57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1159.2	105.5	1021.0				
58062	SALSBRYS	161	58064	NORTON-5	161	1	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1104.3	100.5	1021.0				
							59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.4	100.7	49.0			
							59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	96.0	127.3	103.5	107.0	136.2	110.7	
58066	S.OTTWA5	161	58069	PAOLA	5	161	58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	293.0	243.0	320.4	109.3	227.0			
							57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	224.0	183.0	257.5	115.0	168.0	229.7	102.6		
58067	CENTENL5	161	58068	WAGSTAF5	161	1	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1161.1	105.7	1021.0				
							58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	57.0	184.2	105.9	43.0				
58067	CENTENL5	161	58069	PAOLA	5	161	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1170.1	106.5	1021.0				
							58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	57.0	201.0	115.5	43.0	176.1	101.2		
59200	PHILL	7	345	59225	PHILL	5	161	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.5	101.1	49.0	50.3	100.6
59202	SIBLEY	5	161	59235	DUNCAN	5	161	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.2	100.5	49.0		
59202	SIBLEY	5	161	59244	ORRICK	5	161	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.7	49.0		
59205	BLSPE	5	161	59227	OAKGRV	5	161	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.6	49.0		

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59206	PRALEE	5	161	59233	LEESUM	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.4	100.7	49.0			
59207	ARCHIE	5	161	59240	ADRIAN	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	53.4	106.7	49.0	53.7	107.4	
59208	NEVADA	5	161	59216	BUTLER_5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.2	102.5	49.0	51.4	102.8	
59209	SEDALIA5	161		59217	WINDSR	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.9	101.8	49.0	50.8	101.5	
59216	BUTLER_5	161		59240	ADRIAN	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.7	105.4	49.0	53.0	106.1	
59218	GRNWD	5	161	59233	LEESUM	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.5	101.0	49.0	50.3	100.5	
59221	PLTCTY	5	161	59231	STRANGR5	161	1		57968	STILWEL7	345		57981	LACYGNE7	345	1	LN	1099.0	1099.0	1110.8	101.1	1021.0			
									57982	IATAN	7	345	69702	ST JOE	3	345	1	LN	956.0	547.0			944.0	997.7	104.4
59224	LNGVW	5	161	59249	HOOKRD	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.9	103.7	49.0	51.5	103.1	
									57969	STILWEL5	161		58053	REDEL	5	161	1	LN	293.0	271.0	322.4	110.0	264.0	313.2	106.9
59225	PHILL	5	161	59243	LKWINGB5	161	1		58002	MARTCIT5	161		58053	REDEL	5	161	1	LN	293.0	233.0	294.6	100.5	226.0		
									59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.2	104.4	49.0	51.9	103.7	
									57969	STILWEL5	161		58053	REDEL	5	161	1	LN	293.0	271.0	329.5	112.5	264.0	320.3	109.3
59228	WBURGE	5	161	59229	ODESSA	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.4	100.8	49.0	50.3	100.6	
									59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	96.0			107.0	131.3	106.8	
59236	RICHMND5	161		59244	ORRICK	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.6	49.0			
59243	LKWINGB5	161		59249	HOOKRD	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.0	104.0	49.0	51.7	103.3	
									57969	STILWEL5	161		58053	REDEL	5	161	1	LN	293.0	271.0	325.2	111.0	264.0	316.0	107.8
96071	5CLINTN	161		57995	MONTROS5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.9	105.8	49.0	53.3	106.5	
56772	STRANGR7	345		57977	CRAIG	7	345	1	57982	IATAN	7	345	69702	ST JOE	3	345	1	LN	956.0	547.0			944.0	1122.5	117.4
56772	STRANGR7	345		57982	IATAN	7	345	1	57982	IATAN	7	345	69702	ST JOE	3	345	1	LN	956.0	547.0			944.0	1524.0	159.4
59200	PHILL	7	345	59201	SIBLEY	7	345	1	57982	IATAN	7	345	69702	ST JOE	3	345	1	LN	956.0	547.0			944.0	978.1	102.3

Branch Violations

Table C-2 2005 Summer Base Case vs Customer 900MW Including Iatan-Nashua 345kV Circuit

*** MUST 4.00 *** THU, JUL 05 2001 7:38 ***
 1-2001 SOUTHWEST POWER POOL POWER FLOW MODEL
 2004 SUMMER PEAK (04SP) BASE CASE

start: 8:21:03 AM
 end: 8:21:31 AM
 elapsed: 0:00:28

Notes:

04 Summer Base Case vs Customer with 900MW generation and Iatan-Nashua tie additions

*****Comparison of Base case flows to Contingency flows*****

Contingency	Monitored Element	Rating	Base Case		Study Case			
			Normal	Contingency Flow % of Rating	Normal	Contingency Flow % of Rating		
56765 HOYT 7 345 56766 JEC N 7 345 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	238.0	281.5	100.5	229.0		
	57965 W.GRDNR7 345 58105 IPP#2 345 1 LN	1099.0	972.0	1112.4	101.2	873.0		
56766 JEC N 7 345 56770 MORRIS 7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1106.6	100.7	989.0		
56769 LANG 7 345 56774 SWISVAL7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1121.5	102.0	989.0		
56769 LANG 7 345 56796 WICHITA7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1131.2	102.9	989.0		
56772 STRANGR7 345 59231 STRANGR5 161 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1110.6	101.1	989.0		
56774 SWISVAL7 345 57968 STILWEL7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1120.6	102.0	989.0		
56791 BENTON 7 345 56797 WOLFCRK7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1171.7	106.6	989.0		
56793 NEOSHO 7 345 57981 LACYGNE7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1160.8	105.6	989.0	1117.4	101.7
56794 ROSEHIL7 345 56797 WOLFCRK7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1163.9	105.9	989.0		
56851 AUBURN 6 230 56852 JEC 6 230 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1115.4	101.5	989.0		
56853 LAWHILL6 230 56854 LEC U5 6 230 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1132.9	103.1	989.0		
56853 LAWHILL6 230 56855 MIDLAND6 230 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	238.0	357.3	127.6	229.0	343.6	122.7
57965 W.GRDNR7 345 57966 WGARDNR5 161 11	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1143.1	104.0	989.0		
57965 W.GRDNR7 345 57977 CRAIG 7 345 1	57969 STILWEL5 161 58057 BUCYRUS5 161 1 LN	224.0	183.0	229.0	102.2	164.0		
	57969 STILWEL5 161 58053 REDEL 5 161 1 LN	293.0	271.0	313.7	107.1	250.0		
	58037 OLATHEW5 161 58043 MURLEN 5 161 1 LN	293.0	120.0	339.2	115.8	109.0	297.8	101.6
	57965 W.GRDNR7 345 57966 WGARDNR5 161 11 TR	400.0	206.0	484.4	121.1	206.0	447.5	111.9
	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1099.0	1450.7	132.0	989.0	1305.5	118.8
	58043 MURLEN 5 161 58044 MOONLT 5 161 1 LN	293.0	177.0	397.1	135.5	167.0	355.2	121.2
	57966 WGARDNR5 161 58044 MOONLT 5 161 1 LN	293.0	218.0	435.4	148.6	207.0	393.6	134.3

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57965	W.GRDNR7	345	58105	IPP#2	345	1	58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	87.0	100.9	100.9	82.0			
							57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	317.0	108.2	250.0			
							57993	STHTOWN5	161	59210	MARTCTY5	161	1	LN	224.0	161.0	244.9	109.3	132.0				
							58036	OLATHEE5	161	58046	OXFORD	5	161	1	LN	293.0	156.0	357.7	122.1	130.0	306.1	104.5	
							57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1781.8	162.1	989.0	1607.5	146.3		
57966	WGARDNR5	161	58044	MOONLT	5	161	1	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1138.4	103.6	989.0			
57968	STILWEL7	345	57969	STILWEL5	161	22		57968	STILWEL7	345	57969	STILWEL5	161	11	TR	550.0	368.0	563.5	102.5	347.0			
57968	STILWEL7	345	57981	LACYGNE7	345	1		58067	CENTENL5	161	58068	WAGSTAF5	161	1	LN	293.0	215.0	300.1	102.4	195.0			
							57966	WGARDNR5	161	58044	MOONLT	5	161	1	LN	293.0	218.0	304.4	103.9	207.0			
							57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	240.0	309.0	105.5	215.0			
							58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	293.0	243.0	328.8	112.2	223.0	298.4	101.8	
							57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	224.0	183.0	264.4	118.0	164.0	234.8	104.8		
							57965	W.GRDNR7	345	57977	CRAIG	7	345	1	LN	1099.0	771.0	1304.3	118.7	671.0	1153.4	105.0	
							57965	W.GRDNR7	345	58105	IPP#2	345	1	LN	1099.0	972.0	1641.0	149.3	873.0	1474.8	134.2		
57968	STILWEL7	345	59200	PHILL	7	345	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.3	102.6	49.0	50.6	101.3
							58002	MARTCIT5	161	58053	REDEL	5	161	1	LN	293.0	233.0	318.9	108.8	212.0			
							57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	353.1	120.5	250.0	316.1	107.9	
57969	STILWEL5	161	57994	HICKMAN5	161	1		58002	MARTCIT5	161	58053	REDEL	5	161	1	LN	293.0	233.0	295.1	100.7	212.0		
							59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.5	101.0	49.0			
							57993	STHTOWN5	161	59210	MARTCTY5	161	1	LN	224.0	161.0	233.2	104.1	132.0				
							57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	329.9	112.6	250.0	300.1	102.4	
57969	STILWEL5	161	58050	ANTIOCH5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.6	101.1	49.0		
							57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	316.7	108.1	250.0			
57969	STILWEL5	161	58053	REDEL	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.5	105.0	49.0	51.9	103.7
57969	STILWEL5	161	58057	BUCYRUS5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1149.6	104.6	989.0			
69702	ST JOE	3	345	57972	HAWTH	7	345	1	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1115.3	101.5	989.0		
57973	HAWTHRN5	161	57976	LEVEE	5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	246.0	301.9	103.0	198.0			
							57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	211.0	314.3	107.3	192.0				
57973	HAWTHRN5	161	58011	CHOUTEU5	161	1		57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	246.0	297.9	101.7	198.0			
							57973	HAWTHRN5	161	57976	LEVEE	5	161	1	LN	293.0	218.0	321.5	109.7	199.0			
							57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	218.0	321.7	109.8	199.0		
57973	HAWTHRN5	161	58027	RANDLPH5	161	1		57973	HAWTHRN5	161	57976	LEVEE	5	161	1	LN	293.0	218.0	307.3	104.9	199.0		
							57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	218.0	307.4	104.9	199.0		
57976	LEVEE	5	161	57985	NEAST	5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	246.0	301.9	103.0	198.0		
							57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	211.0	314.4	107.3	192.0				
57977	CRAIG	7	345	57978	CRAIG	5	161	11	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1127.1	102.6	989.0		

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57977	CRAIG	7	345	57978	CRAIG	5	161	22	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1126.8	102.5	989.0				
57977	CRAIG	7	345	57978	CRAIG	5	161	33	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1118.4	101.8	989.0				
57978	CRAIG	5	161	57979	PFLUMM	5	161	1	58031	GRNWOOD5	161	58039	LENEXAN5	161	1	LN	293.0	223.0	294.6	100.5	197.0				
									57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1115.5	101.5	989.0				
									57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	240.0	311.3	106.3	215.0			
57978	CRAIG	5	161	58038	LENEXAS5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1108.8	100.9	989.0				
57978	CRAIG	5	161	58039	LENEXAN5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1110.3	101.0	989.0				
57978	CRAIG	5	161	58048	COLLEGE5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1107.8	100.8	989.0				
57978	CRAIG	5	161	58049	CEDRCRK5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1104.3	100.5	989.0				
									57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	240.0	304.2	103.8	215.0			
57979	PFLUMM	5	161	58047	OVERLPK5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1114.1	101.4	989.0				
									57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	240.0	305.4	104.2	215.0			
57981	LACYGNE7	345	58105	IPP#2		345	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1402.5	127.6	989.0	1234.1	112.3		
69702	ST JOE	3	345	57982	IATAN	7	345	1	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1144.5	104.1	989.0				
57985	NEAST	5	161	58011	CHOUTEU5	161	1		57973	HAWTHRN5	161	57976	LEVVEE	5	161	1	LN	293.0	218.0	310.6	106.0	199.0			
									57976	LEVVEE	5	161	57985	NEAST	5	161	1	LN	293.0	218.0	310.8	106.1	199.0		
57993	STHTOWN5	161	57994	HICKMAN5	161	1			59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.7	49.0			
									57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	312.9	106.8	250.0			
57993	STHTOWN5	161	58001	FOREST	5	161	1		58032	MERRIAM5	161	58040	ROEPARK5	161	1	LN	187.0	80.0	190.1	101.7	78.0				
57999	LVISTAW5	161	58013	HARSNVL5	161	1			59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.2	100.5	49.0			
58002	MARTCIT5	161	58053	REDEL	5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.1	104.2	49.0	51.5	103.0	
58002	MARTCIT5	161	59210	MARTCTY5	161	1			59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.7	103.4	49.0	51.0	102.1	
58015	AVONDAL5	161	58027	RANDLPH5	161	1			57973	HAWTHRN5	161	57976	LEVVEE	5	161	1	LN	293.0	218.0	299.3	102.2	199.0			
									57976	LEVVEE	5	161	57985	NEAST	5	161	1	LN	293.0	218.0	299.5	102.2	199.0		
58031	GRNWOOD5	161	58039	LENEXAN5	161	1			57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1109.5	101.0	989.0				
58031	GRNWOOD5	161	58049	CEDRCRK5	161	1			57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	240.0	297.0	101.4	215.0			
58032	MERRIAM5	161	58040	ROEPARK5	161	1			57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1104.5	100.5	989.0				
58034	KNLWRTH5	161	58052	REEDER	5	161	1		57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1105.6	100.6	989.0				
58036	OLATHEE5	161	58046	OXFORD	5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.6	49.0			

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						57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	297.5	101.5	250.0											
58037	OLATHEW5	161	58043	MURLEN	5	161	1								57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1120.8	102.0	989.0			
58038	LENEXAS5	161	58052	REEDER	5	161	1								57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1106.8	100.7	989.0			
58043	MURLEN	5	161	58044	MOONLT	5	161	1							57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1131.5	103.0	989.0			
58046	OXFORD	5	161	58050	ANTIOCH5	161	1								59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.5	101.0	49.0		
															57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	310.7	106.0	250.0		
58057	BUCYRUS5	161	58068	WAGSTAF5	161	1									58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	57.0	180.4	103.7	48.0			
															57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1159.2	105.5	989.0			
58062	SALSBRYS	161	58064	NORTON-5	161	1									57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1104.3	100.5	989.0			
															59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.4	100.7	49.0		
															59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	96.0	127.3	103.5	106.0	134.5	109.4
58066	S.OTTWA5	161	58069	PAOLA	5	161	1								58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	293.0	243.0	320.4	109.3	223.0		
															57969	STILWEL5	161	58057	BUCYRUS5	161	1	LN	224.0	183.0	257.5	115.0	164.0	228.6	102.1	
58067	CENTENL5	161	58068	WAGSTAF5	161	1									57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1161.1	105.7	989.0			
															58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	57.0	184.2	105.9	48.0			
58067	CENTENL5	161	58069	PAOLA	5	161	1								57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1170.1	106.5	989.0			
															58066	S.OTTWA5	161	58077	SRICHLN5	161	1	LN	174.0	57.0	201.0	115.5	48.0	177.3	101.9	
59200	PHILL	7	345	59225	PHILL	5	161	1							59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.5	101.1	49.0		
59202	SIBLEY	5	161	59235	DUNCAN	5	161	1							59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.2	100.5	49.0		
59202	SIBLEY	5	161	59244	ORRICK	5	161	1							59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.7	49.0		
59205	BLSPE	5	161	59227	OAKGRV	5	161	1							59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.6	49.0		
59206	PRALEE	5	161	59233	LEESUM	5	161	1							59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.4	100.7	49.0		
59207	ARCHIE	5	161	59240	ADRIAN	5	161	1							59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	53.4	106.7	49.0	53.5	107.1
59208	NEVADA	5	161	59216	BUTLER_5	161	1								59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.2	102.5	49.0	51.2	102.4
59209	SEDALIA5	161	59217	WINDSR	5	161	1								59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.9	101.8	49.0	50.6	101.1
59216	BUTLER_5	161	59240	ADRIAN	5	161	1								59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.7	105.4	49.0	52.9	105.8
59218	GRNWD	5	161	59233	LEESUM	5	161	1							59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.5	101.0	49.0		
59221	PLTCTY	5	161	59231	STRANGR5	161	1								57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1099.0	1110.8	101.1	989.0			
59224	LNGVW	5	161	59249	HOOKRD	5	161	1							59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.9	103.7	49.0	51.3	102.6
															57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	322.4	110.0	250.0	297.5	101.5

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59225	PHILL	5	161	59243	LKWINGB5	161	1	58002	MARTCIT5	161	58053	REDEL	5	161	1	LN	293.0	233.0	294.6	100.5	212.0			
								59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.2	104.4	49.0	51.6	103.2	
								57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	329.5	112.5	250.0	304.6	104.0	
59228	WBURGE	5	161	59229	ODESSA	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.4	100.8	49.0		
								59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	96.0			106.0	131.2	106.7	
59236	RICHMND5	161	59244	ORRICK	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.6	49.0			
59243	LKWINGB5	161	59249	HOOKRD	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.0	104.0	49.0	51.4	102.8	
								57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	271.0	325.2	111.0	250.0	300.2	102.5	
96071	5CLINTN	161	57995	MONTROS5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.9	105.8	49.0	53.0	106.1		
59228	WBURGE	5	161	59234	WAFB	5	161	1	59228	WBURGE	5	161	59269	WBURGE	269.0	1	TR	50.0	44.0			43.0	51.2	102.4

Branch Violations

Table D-1 2005 Winter Base Case with Customer 900MW

*** MUST 4.00 *** THU, JUL 05 2001 7:48 ***
 1-2001 SOUTHWEST POWER POOL POWER FLOW MODEL
 2004 WINTER PEAK (04WP)SEE LONG TITLE

start: start: 8:24:35 AM
 end: 8:24:44 AM
 elapsed: 0:00:09

Notes:

04 Winter Base Case vs Customer with 900MW generation

*****Comparison of Base case flows to Contingency flows*****

Contingency		Monitored Element				Rating	Normal	Base Case Contingency Flow	% of Rating	Normal	Study Case Contingency Flow	% of Rating					
56853	LAWHILL6 230	56853	MIDLAND6 230	1	56853	LAWHILL6 230	57250	LWRNCHL3 115	1	TR	280.0	208.0	301.9	107.8	201.0	291.0	103.9
57965	W.GRDNR7 345	58105	IPP#2 345	1	57968	STILWEL7 345	57981	LACYGNE7 345	1	LN	1315.0	956.0	1423.6	108.3	895.0		
56772	STRANGR7 345	57977	CRAIG 7 345	1	57982	IATAN 7 345	69702	ST JOE 3 345	1	LN	956.0	540.0			932.0	1127.3	117.9
56772	STRANGR7 345	57982	IATAN 7 345	1	57982	IATAN 7 345	69702	ST JOE 3 345	1	LN	956.0	540.0			932.0	1526.1	159.6
56772	STRANGR7 345	59231	STRANGR5 161	1	57982	IATAN 7 345	69702	ST JOE 3 345	1	LN	956.0	540.0			932.0	974.4	101.9
57968	STILWEL7 345	57981	LACYGNE7 345	1	57982	IATAN 7 345	69702	ST JOE 3 345	1	LN	956.0	540.0			932.0	973.1	101.8
57968	STILWEL7 345	59200	PHILL 7 345	1	57982	IATAN 7 345	69702	ST JOE 3 345	1	LN	956.0	540.0			932.0	973.3	101.8
69702	ST JOE 3 345	57982	IATAN 7 345	1	56772	STRANGR7 345	57982	IATAN 7 345	1	LN	1195.0	168.0			613.0	1549.3	129.6
59221	PLTCTY 5 161	59231	STRANGR5 161	1	57982	IATAN 7 345	69702	ST JOE 3 345	1	LN	956.0	540.0			932.0	974.3	101.9

Branch Violations

Table D-1 2005 Winter Base Case with Customer 900MW Including Iatan-Nashua 345kV Circuit

*** MUST 4.00 *** THU, JUL 05 2001 7:48 ***
 1-2001 SOUTHWEST POWER POOL POWER FLOW MODEL
 2004 WINTER PEAK (04WP)SEE LONG TITLE

start: 8:24:38 AM
 end: 8:24:45 AM
 elapsed: 0:00:07

Notes:

04 Winter Base Case vs Customer with 900MW generation and Iatan-Nashua tie additions

*****Comparison of Base case flows to Contingency flows*****

Contingency		Monitored Element				Rating	Normal	Base Case Contingency Flow	% of Rating	Normal	Study Case Contingency Flow	% of Rating
56853	LAWHILL6 230 56855 MIDLAND6 230 1	56853	LAWHILL6 230	57250	LWRNCHL3 115 1	TR	280.0	208.0	301.9	107.8	200.0	289.2 103.3
57965	W.GRDNR7 345 58105 IPP#2 345 1	57968	STILWEL7 345	57981	LACYGNE7 345 1	LN	1315.0	956.0	1423.6	108.3	863.0	
59228	WBURGE 5 161 59234 WAFB 5 161 1	59228	WBURGE 5 161	59269	WBURGE 269.0 1	TR	50.0	32.0			32.0	50.9 101.8

Branch Violations

Table E-1 2006 Summer Base Case with Customer 900MW

*** MUST 4.00 *** THU, JUL 05 2001 8:11 ***
 1-2001 SOUTHWEST POWER POOL POWER FLOW MODEL
 2006 SUMMER PEAK (06SP) BASE CASE

start: 8:27:12 AM
 end: 8:27:31 AM
 elapsed: 0:00:19

Notes:

06 Summer Base Case vs Customer with 900MW generation

*****Comparison of Base case flows to Contingency flows*****

Contingency	Monitored Element	Rating	Base Case		Study Case	
			Normal	Contingency Flow % of Rating	Normal	Contingency Flow % of Rating
56772 STRANGR7 345 59231 STRANGR5 161 1	57973 HAWTHRN5 161 58027 RANDLPH5 161 1 LN	293.0	274.0	296.0	101.0	258.0
56791 BENTON 7 345 56797 WOLFCRK7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1027.0	1119.0	101.8	973.0
56793 NEOSHO 7 345 57981 LACYGNE7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1027.0	1133.1	103.1	973.0 1132.4 103.0
56794 ROSEHIL7 345 56797 WOLFCRK7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1027.0	1111.3	101.1	973.0
56853 LAWHILL6 230 56854 LEC U5 6 230 1	58042 SPRGHL 5 161 57267 SPRINGH3 115 1 TR	100.0	94.0	102.8	102.8	86.0
56853 LAWHILL6 230 56855 MIDLAND6 230 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	213.0	313.3	111.9	205.0 301.7 107.7
56853 LAWHILL6 230 56856 SWISVAL6 230 1	58042 SPRGHL 5 161 57267 SPRINGH3 115 1 TR	100.0	94.0	101.9	101.9	86.0
56916 PENTAGN5 161 56917 PENTGNT5 161 1	58042 SPRGHL 5 161 57267 SPRINGH3 115 1 TR	100.0	94.0	109.0	109.0	86.0
57965 W.GRDNR7 345 57977 CRAIG 7 345 1	58042 SPRGHL 5 161 57267 SPRINGH3 115 1 TR	100.0	94.0	107.4	107.4	86.0
	58037 OLATHEW5 161 58043 MURLEN 5 161 1 LN	293.0	111.0	321.2	109.6	109.0
	57965 W.GRDNR7 345 57966 WGARDNR5 161 11 TR	400.0	210.0	478.1	119.5	225.0 439.7 109.9
	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1027.0	1380.1	125.6	973.0 1252.1 113.9
	58043 MURLEN 5 161 58044 MOONLT 5 161 1 LN	293.0	171.0	381.7	130.3	170.0 336.5 114.8
57965 W.GRDNR7 345 58105 IPP#2 345 1	57966 WGARDNR5 161 58044 MOONLT 5 161 1 LN	293.0	216.0	423.9	144.7	214.0 378.6 129.2
	57982 IATAN 7 345 57957 IAT G1 124.0 1 TR	724.0	690.0	728.8	100.7	681.0
	57969 STILWEL5 161 58053 REDEL 5 161 1 LN	293.0	253.0	297.4	101.5	244.0
	57993 STHTOWN5 161 59210 MARTCTY5 161 1 LN	224.0	155.0	237.3	105.9	130.0
	58042 SPRGHL 5 161 57267 SPRINGH3 115 1 TR	100.0	94.0	108.3	108.3	86.0
57968 STILWEL7 345 57969 STILWEL5 161 11 TR	58036 OLATHEE5 161 58046 OXFORD 5 161 1 LN	293.0	157.0	353.8	120.8	113.0
	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1027.0	1704.0	155.0	973.0 1546.9 140.8
	57968 STILWEL7 345 57969 STILWEL5 161 11 TR	550.0	369.0	562.6	102.3	357.0
57968 STILWEL7 345 57981 LACYGNE7 345 1	57966 WGARDNR5 161 58044 MOONLT 5 161 1 LN	293.0	216.0	297.8	101.6	214.0
	58067 CENTENL5 161 58069 PAOLA 5 161 1 LN	293.0	232.0	313.0	106.8	218.0
	57965 W.GRDNR7 345 57977 CRAIG 7 345 1 LN	1099.0	739.0	1244.3	113.2	590.0
	57965 W.GRDNR7 345 58105 IPP#2 345 1 LN	1099.0	945.0	1578.8	143.7	814.0 1403.5 127.7

KCPL Transmission Planning

						57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	228.0			245.0	306.8	104.7	
57968	STILWEL7	345	59200	PHILL	7	345	1															
						59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.1	102.1	49.0	50.7	101.5	
						57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	318.2	108.6	244.0	309.7	105.7	
57969	STILWEL5	161	57994	HICKMAN5	161	1																
						59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.5	49.0			
						58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	100.7	100.7	86.0			
						57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	307.4	104.9	244.0	294.3	100.4	
57969	STILWEL5	161	58050	ANTIOCH5	161	1																
						59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.4	100.8	49.0			
						57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	298.8	102.0	244.0			
						58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	106.9	106.9	86.0			
						57978	CRAIG	5	161	58048	COLLEGE5	161	1	LN	293.0	136.0			173.0	301.7	103.0	
57969	STILWEL5	161	58053	REDEL	5	161	1															
						58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	101.9	101.9	86.0			
						59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.3	104.6	49.0	51.9	103.7	
57969	STILWEL5	161	58057	BUCYRUS5	161	1																
						59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.5	101.1	49.0			
57973	HAWTHRN5	161	57976	LEVEE	5	161	1															
						57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	245.0	300.0	102.4	231.0				
						57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	301.5	102.9	258.0				
57973	HAWTHRN5	161	58011	CHOUTEU5	161	1																
						58015	AVONDAL5	161	58027	RANDLPH5	161	1	LN	293.0	249.0	312.4	106.6	233.0				
						57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	333.9	114.0	258.0	314.5	107.3		
						57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	257.0	376.3	128.4	241.0	354.0	120.8
57973	HAWTHRN5	161	58027	RANDLPH5	161	1																
						57985	NEAST	5	161	58011	CHOUTEU5	161	1	LN	293.0	221.0	314.3	107.3	207.0	294.7	100.6	
						57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	245.0	336.3	114.8	231.0	316.7	108.1		
						57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	257.0	354.1	120.9	241.0	333.2	113.7
57976	LEVEE	5	161	57985	NEAST	5	161	1														
						58015	AVONDAL5	161	58027	RANDLPH5	161	1	LN	293.0	249.0	317.8	108.5	233.0	297.9	101.7		
						57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	339.2	115.8	258.0	319.4	109.0		
						57985	NEAST	5	161	58011	CHOUTEU5	161	1	LN	293.0	221.0	344.6	117.6	207.0	323.0	110.2	
						57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	245.0	366.6	125.1	231.0	345.0	117.8		
57978	CRAIG	5	161	57979	PFLUMM	5	161	1														
						57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	228.0	298.2	101.8	245.0	321.5	109.7	
						58031	GRNWOOD5	161	58039	LENEXAN5	161	1	LN	293.0	209.0			226.0	304.0	103.7		
57981	LACYGNE7	345	58105	IPP#2	345	1																
						58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	101.0	101.0	86.0			
						57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1027.0	1327.6	120.8	973.0	1175.9	107.0		
69702	ST JOE	3	345	57982	IATAN	7	345	1														
						57982	IATAN	7	345	57957	IAT G1	124.0	1	TR	724.0	690.0	728.7	100.6	681.0			
						59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0			118.0	127.4	103.6	
						58031	GRNWOOD5	161	58039	LENEXAN5	161	1	LN	293.0	209.0			226.0	311.1	106.2		
						57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	228.0			245.0	328.4	112.1	
						56772	STRANGR7	345	57982	IATAN	7	345	1	LN	1099.0	232.0			668.0	1571.1	143.0	
57985	NEAST	5	161	58011	CHOUTEU5	161	1															
						58015	AVONDAL5	161	58027	RANDLPH5	161	1	LN	293.0	249.0	306.5	104.6	233.0				
						57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	327.9	111.9	258.0	308.5	105.3		
						57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	257.0	365.0	124.6	241.0	342.7	117.0

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57985	NEAST	5	161	58018	NKANCTY5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	300.0	102.4	258.0				
58002	MARTCIT5	161	58053	REDEL	5	161	1	58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	100.8	100.8	86.0			
								59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.8	103.7	49.0	51.4	102.8	
58002	MARTCIT5	161	59210	MARTCTY5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.3	102.6	49.0	50.9	101.8	
58015	AVONDAL5	161	58027	RANDLPH5	161	1		57985	NEAST	5	161	58011	CHOUTEU5	161	1	LN	293.0	221.0	306.7	104.7	207.0			
								57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	245.0	328.6	112.2	231.0	309.0	105.5		
								57976	LEVVEE	5	161	57985	NEAST	5	161	1	LN	293.0	257.0	346.0	118.1	241.0	325.0	110.9
58028	NASHUA-5	161	58029	SHOLCRK5	161	1		57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	307.9	105.1	258.0	300.1	102.4		
58036	OLATHEE5	161	58046	OXFORD	5	161	1	58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	102.1	102.1	86.0			
58046	OXFORD	5	161	58050	ANTIOCH5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.6	49.0			
								58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	105.4	105.4	86.0			
58062	SALSBRYS	161	58064	NORTON-5	161	1		59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0	143.2	116.4	118.0	148.0	120.3	
58066	S.OTTWA5	161	58069	PAOLA	5	161	1	58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	293.0	232.0	307.0	104.8	218.0			
58067	CENTENL5	161	58069	PAOLA	5	161	1	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1027.0	1111.5	101.1	973.0				
59202	SIBLEY	5	161	59215	HLLMRK	5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	298.0	101.7	258.0			
59205	BLSPE	5	161	59227	OAKGRV	5	161	1	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0	124.1	100.9	118.0	133.1	108.2
59207	ARCHIE	5	161	59240	ADRIAN	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.6	105.2	49.0	52.8	105.6
								57995	MONTROS5	161	96071	5CLINTN	161	1	LN	370.0	295.0			337.0	371.8	100.5		
59208	NEVADA	5	161	59216	BUTLER_5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.6	101.3	49.0	50.7	101.4	
								59216	BUTLER_5	161	96689	2BUTLER	69.0	1	TR	56.0	39.0			42.0	58.7	104.9		
59209	SEDALIA5	161	59217	WINDSR	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.6	101.3	49.0	50.4	100.8	
59216	BUTLER_5	161	59240	ADRIAN	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.0	104.1	49.0	52.2	104.4	
59220	FROSTRD5	161	59245	KCSOUTH5	161	1		59206	PRALEE	5	161	59211	BLSPS	5	161	1	LN	223.0	163.0	226.6	101.6	164.0	229.3	102.8
59221	PLTCTY	5	161	59231	STRANGR5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	296.2	101.1	258.0				
59224	LNGVW	5	161	59245	KCSOUTH5	161	1	59206	PRALEE	5	161	59211	BLSPS	5	161	1	LN	223.0	163.0	237.3	106.4	164.0	240.1	107.6
59224	LNGVW	5	161	59249	HOOKRD	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.4	102.8	49.0	51.0	102.0
								57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	310.1	105.8	244.0	299.5	102.2	
59225	PHILL	5	161	59243	LKWINGB5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.7	103.4	49.0	51.3	102.6	
								57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	317.8	108.5	244.0	307.3	104.9	
59228	WBURGE	5	161	59229	ODESSA	5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.7	49.0	50.2	100.4

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					59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0	134.1	109.0	118.0	146.5	119.1					
59243	LKWINGB5	161	59249	HOOKRD	5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.5	103.0	49.0	51.1	102.2	
					57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	313.1	106.8	244.0	302.5	103.2					
96071	5CLINTN	161	57995	MONTROS5	161	1			59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.4	104.9	49.0	52.5	105.1	
					59216	BUTLER_5	161	96689	2BUTLER	69.0	1	TR		56.0	39.0			42.0	58.8	105.1					
96105	5NORTON	161	58064	NORTON-5	161	1			59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0	128.2	104.2	118.0	133.6	108.6	
56772	STRANGR7	345	57977	CRAIG	7	345	1		57982	IATAN	7	345	69702	ST JOE	3	345	1	LN	956.0	475.0			897.0	1091.9	114.2
56772	STRANGR7	345	57982	IATAN	7	345	1		57982	IATAN	7	345	69702	ST JOE	3	345	1	LN	956.0	475.0			897.0	1525.1	159.5
57977	CRAIG	7	345	57978	CRAIG	5	161	11	57977	CRAIG	7	345	57978	CRAIG	5	161	22	TR	550.0	357.0			398.0	558.6	101.6
					57977	CRAIG	7	345	57978	CRAIG	5	161	33	TR					400.0	271.0			302.0	424.2	106.1
57977	CRAIG	7	345	57978	CRAIG	5	161	22	57977	CRAIG	7	345	57978	CRAIG	5	161	11	TR	550.0	361.0			402.0	561.7	102.1
					57977	CRAIG	7	345	57978	CRAIG	5	161	33	TR					400.0	271.0			302.0	422.7	105.7
57978	CRAIG	5	161	58049	CEDRCRK5	161	1		57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	228.0			245.0	310.2	105.9	
57979	PFLUMM	5	161	58047	OVERLPK5	161	1		58031	GRNWOOD5	161	58039	LENEXAN5	161	1	LN	293.0	209.0			226.0	297.8	101.7		
					57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN					293.0	228.0			245.0	315.3	107.6	
58031	GRNWOOD5	161	58049	CEDRCRK5	161	1			57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	228.0			245.0	302.7	103.3	
59202	SIBLEY	5	161	59244	ORRICK	5	161	1	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0			118.0	125.7	102.2	
59227	OAKGRV	5	161	59229	ODESSA	5	161	1	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0			118.0	129.7	105.4	
59228	WBURGE	5	161	59234	WAFB	5	161	1	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0			118.0	128.3	104.3	
59236	RICHMND5	161	59244	ORRICK	5	161	1		59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0			118.0	124.9	101.5	
96120	5THMHIL	161	58062	SALSBRY5	161	1			59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0			118.0	127.3	103.5	

Branch Violations

Table E-2 2006 Summer Base Case with Customer 900MW Including Iatan-Nashua 345kV Circuit.

*** MUST 4.00 *** THU, JUL 05 2001 8:11 ***
 1-2001 SOUTHWEST POWER POOL POWER FLOW MODEL
 2006 SUMMER PEAK (06SP) BASE CASE

start: 8:27:09 AM
 end: 8:27:31 AM
 elapsed: 0:00:22

Notes:

06 Summer Base Case vs Customer with 900MW generation with Iatan-Nashua tie additions

*****Comparison of Base case flows to Contingency flows*****

Contingency	Monitored Element	Rating	Base Case		Study Case	
			Normal	Contingency Flow % of Rating	Normal	Contingency Flow % of Rating
56772 STRANGR7 345 59231 STRANGR5 161 1	57973 HAWTHRN5 161 58027 RANDLPH5 161 1 LN	293.0	274.0	296.0	101.0	218.0
56791 BENTON 7 345 56797 WOLFCRK7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1027.0	1119.0	101.8	942.0
56793 NEOSHO 7 345 57981 LACYGNE7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1027.0	1133.1	103.1	942.0
56794 ROSEHIL7 345 56797 WOLFCRK7 345 1	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1027.0	1111.3	101.1	942.0
56853 LAWHILL6 230 56854 LEC U5 6 230 1	58042 SPRGHL 5 161 57267 SPRINGH3 115 1 TR	100.0	94.0	102.8	102.8	88.0
56853 LAWHILL6 230 56855 MIDLAND6 230 1	56853 LAWHILL6 230 57250 LWRNCHL3 115 1 TR	280.0	213.0	313.3	111.9	204.0 299.4 106.9
56853 LAWHILL6 230 56856 SWISVAL6 230 1	58042 SPRGHL 5 161 57267 SPRINGH3 115 1 TR	100.0	94.0	101.9	101.9	88.0
56916 PENTAGN5 161 56917 PENTGNT5 161 1	58042 SPRGHL 5 161 57267 SPRINGH3 115 1 TR	100.0	94.0	109.0	109.0	88.0 103.0 103.0
57965 W.GRDNR7 345 57977 CRAIG 7 345 1	58042 SPRGHL 5 161 57267 SPRINGH3 115 1 TR	100.0	94.0	107.4	107.4	88.0
	58037 OLATHEW5 161 58043 MURLEN 5 161 1 LN	293.0	111.0	321.2	109.6	102.0
	57965 W.GRDNR7 345 57966 WGARDNR5 161 11 TR	400.0	210.0	478.1	119.5	213.0 440.8 110.2
	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1027.0	1380.1	125.6	942.0 1238.3 112.7
	58043 MURLEN 5 161 58044 MOONLT 5 161 1 LN	293.0	171.0	381.7	130.3	162.0 338.9 115.7
57965 W.GRDNR7 345 58105 IPP#2 345 1	57966 WGARDNR5 161 58044 MOONLT 5 161 1 LN	293.0	216.0	423.9	144.7	206.0 380.8 130.0
	57982 IATAN 7 345 57957 IAT G1 124.0 1 TR	724.0	690.0	728.8	100.7	683.0
	57969 STILWEL5 161 58053 REDEL 5 161 1 LN	293.0	253.0	297.4	101.5	231.0
	57993 STHTOWN5 161 59210 MARTCTY5 161 1 LN	224.0	155.0	237.3	105.9	126.0
	58042 SPRGHL 5 161 57267 SPRINGH3 115 1 TR	100.0	94.0	108.3	108.3	88.0
57965 W.GRDNR7 345 58046 OXFORD 5 161 1 LN	58036 OLATHEE5 161 58046 OXFORD 5 161 1 LN	293.0	157.0	353.8	120.8	125.0 295.3 100.8
	57968 STILWEL7 345 57981 LACYGNE7 345 1 LN	1099.0	1027.0	1704.0	155.0	942.0 1534.4 139.6
57968 STILWEL7 345 57969 STILWEL5 161 22	57968 STILWEL7 345 57969 STILWEL5 161 11 TR	550.0	369.0	562.6	102.3	352.0
57968 STILWEL7 345 57981 LACYGNE7 345 1	57966 WGARDNR5 161 58044 MOONLT 5 161 1 LN	293.0	216.0	297.8	101.6	206.0
	58067 CENTENL5 161 58069 PAOLA 5 161 1 LN	293.0	232.0	313.0	106.8	213.0
	57965 W.GRDNR7 345 57977 CRAIG 7 345 1 LN	1099.0	739.0	1244.3	113.2	631.0
	57965 W.GRDNR7 345 58105 IPP#2 345 1 LN	1099.0	945.0	1578.8	143.7	841.0 1412.0 128.5

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57968	STILWEL7	345	59200	PHILL	7	345	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.1	102.1	48.0			
								57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	318.2	108.6	231.0			
57969	STILWEL5	161	57994	HICKMAN5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.5	48.0			
								58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	100.7	100.7	88.0			
								57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	307.4	104.9	231.0			
57969	STILWEL5	161	58050	ANTIOCH5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.4	100.8	48.0			
								57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	298.8	102.0	231.0			
								58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	106.9	106.9	88.0			
								57978	CRAIG	5	161	58048	COLLEGE5	161	1	LN	293.0	136.0			162.0	296.3	101.1	
57969	STILWEL5	161	58053	REDEL	5	161	1	58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	101.9	101.9	88.0			
								59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.3	104.6	48.0	51.5	102.9	
57969	STILWEL5	161	58057	BUCYRUS5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.5	101.1	48.0			
57973	HAWTHRN5	161	57976	LEVEE	5	161	1	57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	245.0	300.0	102.4	223.0				
								57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	301.5	102.9	218.0				
57973	HAWTHRN5	161	58011	CHOUTEU5	161	1		58015	AVONDAL5	161	58027	RANDLPH5	161	1	LN	293.0	249.0	312.4	106.6	195.0				
								57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	333.9	114.0	218.0				
								57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	257.0	376.3	128.4	233.0	337.4	115.1
57973	HAWTHRN5	161	58027	RANDLPH5	161	1		57985	NEAST	5	161	58011	CHOUTEU5	161	1	LN	293.0	221.0	314.3	107.3	200.0			
								57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	245.0	336.3	114.8	223.0				
								57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	257.0	354.1	120.9	233.0	302.0	103.1
57976	LEVEE	5	161	57985	NEAST	5	161	1	58015	AVONDAL5	161	58027	RANDLPH5	161	1	LN	293.0	249.0	317.8	108.5	195.0			
								57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	339.2	115.8	218.0				
								57985	NEAST	5	161	58011	CHOUTEU5	161	1	LN	293.0	221.0	344.6	117.6	200.0	306.9	104.7	
								57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	245.0	366.6	125.1	223.0	328.7	112.2		
57978	CRAIG	5	161	57979	PFLUMM	5	161	1	57978	CRAIG	5	161	58039	LENEXAN5	161	1	LN	293.0	228.0	298.2	101.8	204.0		
57981	LACYGNE7	345	58105	IPP#2	345	1		58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	101.0	101.0	88.0			
								57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1027.0	1327.6	120.8	942.0	1163.1	105.8		
69702	ST JOE	3	345	57982	IATAN	7	345	1	57982	IATAN	7	345	57957	IAT G1	124.0	1	TR	724.0	690.0	728.7	100.6	683.0		
57985	NEAST	5	161	58011	CHOUTEU5	161	1	58015	AVONDAL5	161	58027	RANDLPH5	161	1	LN	293.0	249.0	306.5	104.6	195.0				
								57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	327.9	111.9	218.0				
								57976	LEVEE	5	161	57985	NEAST	5	161	1	LN	293.0	257.0	365.0	124.6	233.0	326.5	111.4
57985	NEAST	5	161	58018	NKANCTY5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	300.0	102.4	218.0				
58002	MARTCIT5	161	58053	REDEL	5	161	1	58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	100.8	100.8	88.0			
								59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.8	103.7	48.0	51.0	102.0	
58002	MARTCIT5	161	59210	MARTCTY5	161	1		59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.3	102.6	48.0	50.5	101.0	

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58015	AVONDAL5	161	58027	RANDLPH5	161	1	57985	NEAST	5	161	58011	CHOUTEU5	161	1	LN	293.0	221.0	306.7	104.7	200.0				
							57973	HAWTHRN5	161	58011	CHOUTEU5	161	1	LN	293.0	245.0	328.6	112.2	223.0					
							57976	LEVEE	5	161	57985	NEAST	5	161	LN	293.0	257.0	346.0	118.1	233.0	294.6	100.5		
58028	NASHUA-5	161	58029	SHOLCRK5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	307.9	105.1	218.0	299.7	102.3			
58036	OLATHEE5	161	58046	OXFORD	5	161	58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	102.1	102.1	88.0				
58046	OXFORD	5	161	58050	ANTIOCH5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.6	48.0			
							58042	SPRGHL	5	161	57267	SPRINGH3	115	1	TR	100.0	94.0	105.4	105.4	88.0				
58062	SALSBRYS	161	58064	NORTON-5	161	1	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0	143.2	116.4	117.0	146.3	118.9		
58066	S.OTTWA5	161	58069	PAOLA	5	161	58067	CENTENL5	161	58069	PAOLA	5	161	1	LN	293.0	232.0	307.0	104.8	213.0				
58067	CENTENL5	161	58069	PAOLA	5	161	57968	STILWEL7	345	57981	LACYGNE7	345	1	LN	1099.0	1027.0	1111.5	101.1	942.0					
59202	SIBLEY	5	161	59215	HLLMRK	5	161	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	298.0	101.7	218.0				
59205	BLSPE	5	161	59227	OAKGRV	5	161	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0	124.1	100.9	117.0	131.8	107.1	
59207	ARCHIE	5	161	59240	ADRIAN	5	161	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.6	105.2	48.0	52.6	105.1	
59208	NEVADA	5	161	59216	BUTLER_5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.6	101.3	48.0	50.5	100.9	
							59216	BUTLER_5	161	96689	2BUTLER	69.0	1	TR	56.0	39.0			42.0	58.9	105.2			
59209	SEDALIA5	161	59217	WINDSR	5	161	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.6	101.3	48.0				
59216	BUTLER_5	161	59240	ADRIAN	5	161	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.0	104.1	48.0	52.0	104.0		
59220	FROSTRD5	161	59245	KCSOUTH5	161	1	59206	PRALEE	5	161	59211	BLSPS	5	161	1	LN	223.0	163.0	226.6	101.6	151.0			
59221	PLTCTY	5	161	59231	STRANGR5	161	1	57973	HAWTHRN5	161	58027	RANDLPH5	161	1	LN	293.0	274.0	296.2	101.1	218.0				
59224	LNGVW	5	161	59245	KCSOUTH5	161	1	59206	PRALEE	5	161	59211	BLSPS	5	161	1	LN	223.0	163.0	237.3	106.4	151.0		
59224	LNGVW	5	161	59249	HOOKRD	5	161	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.4	102.8	48.0	50.7	101.4	
							57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	310.1	105.8	231.0				
59225	PHILL	5	161	59243	LKWINGB5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.7	103.4	48.0	51.0	102.0	
							57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	317.8	108.5	231.0				
59228	WBURGE	5	161	59229	ODESSA	5	161	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	50.3	100.7	48.0			
							59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0	134.1	109.0	117.0	146.3	118.9		
59243	LKWINGB5	161	59249	HOOKRD	5	161	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	51.5	103.0	48.0	50.8	101.6		
							57969	STILWEL5	161	58053	REDEL	5	161	1	LN	293.0	253.0	313.1	106.8	231.0				
96071	5CLINTN	161	57995	MONTROS5	161	1	59239	HSNVL	5	161	59295	HSNVL	269.0	1	TR	50.0	49.0	52.4	104.9	48.0	52.3	104.5		
							59216	BUTLER_5	161	96689	2BUTLER	69.0	1	TR	56.0	39.0			42.0	58.5	104.5			

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96105	5NORTON	161	58064	NORTON-5	161	1	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0	128.2	104.2	117.0	132.0	107.3	
59202	SIBLEY	5	161	59244	ORRICK	5	161	1	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0		117.0	124.6	101.3
59227	OAKGRV	5	161	59229	ODESSA	5	161	1	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0		117.0	128.4	104.4
59228	WBURGE	5	161	59234	WAFB	5	161	1	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0		117.0	128.1	104.1
59236	RICHMND5	161	59244	ORRICK	5	161	1	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0		117.0	123.8	100.7	
96120	5THMHIL	161	58062	SALSBRY5	161	1	59217	WINDSR	5	161	96071	5CLINTN	161	1	LN	123.0	111.0			117.0	125.7	102.2	