



*System Impact Study for Transmission
Service Request from Empire District
Electric to Western Resources*

*SPP Transmission Planning
(#SPP-1999-015)*

September 28, 1999

Southwest Power Pool Transmission Service Request #126958 SPP System Impact Study SPP-1999-015

At the request of Southwest Power Pool staff, Western Resources evaluated Transmission Service Request 126958 - 200 MW firm transmission service from The Empire District Electric Company to Western Resources, Inc. related to Western Resources' joint ownership of the 600 MW State Line plant. The requested point-to-point service is from 1 May 2001 to 1 May 2011.

The scenarios studied are:

Year		Base	Test
Modeled	Season	Transfer	Transfer
		(MW)	(MW)
2000	April Minimum	0	200
2000	Spring Peak	0	200
2000	Summer Peak	0	200
2000	Fall Peak	0	200
2000/01	Winter Peak	0	200
2003	Summer Peak	0	200
2003/04	Winter Peak	0	200
2005	Summer Peak	0	200
2005/06	Winter Peak	0	200
2008	Summer Peak	0	200

Study Assumptions

For each seasonal case listed above, contingencies within the SPP region test the system's ability to adequately transfer power. Any facility overloaded in a seasonal base case is ignored. Any facility which overloads in both the seasonal base case and test level transfer case for the same contingency is ignored. Any facility overload caused by an outage for which there is an SPP Transmission Operating Procedure or mitigation plan is ignored.

A constraining facility is listed only for the first seasonal case in which it appears. This eliminates repetitive listings.

Any voltage violation in a seasonal base case with no test level transfer is ignored. Any voltage violation in a seasonal base case contingency is ignored. Any voltage violation which occurs in a transfer case, without or with a contingency, is ignored if it also occurs in a base case, without or with a contingency.

SPP Criteria determine contingency violations. More stringent planning criteria which may be used by an SPP member are not considered.

Summary of Constraining Facilities

A constraining facility appears as an overload for the proposed transfer that does not appear without the transfer. Any facility overloaded in a seasonal base case is excluded. Any facility overloaded for a seasonal base case contingency condition is excluded. Any facility which has an SPP Operating Procedure or mitigation plan associated with it is excluded. Constraining facilities are listed by season studied. A constraining facility is listed only for the first seasonal case in which it appears.

2000 April Minimum

None

2000 Spring Peak

None

2000 Summer Peak

None

2000 Fall Peak

None

2000/01 Winter Peak

None

2003 Summer Peak

None

2003/04 Winter Peak

None

2005 Summer Peak

None

2005/06 Winter Peak

None

2008 Summer Peak

Chisolm-Ripley 69 kV line (WERE)

Seasonal Evaluations

2000 April Minimum

Loading Violations

During transfer case conditions, no SPP region transmission facilities exceed their normal ratings.

During contingency conditions, the test level transfer does not cause any overloads of SPP region facilities that do not exist without the transfer.

During contingency conditions, the test level transfer does not relieve any overloads of SPP region facilities that exist without the transfer.

Voltage Violations

During base case conditions, low voltages exist in SWPA, in CESW, in OKGE, in SUNC, and in WERE on buses that are generators with leading vars or are tertiary buses of three-winding auto-transformers with shunt reactors on. High voltages exist in widespread areas on the 69 kV system in CESW, across much of the eastern 115 kV and 69 kV systems of WERE, on the southeastern portion of the MIPU 161 kV system, on the central and southern Kansas City metropolitan area 161 kV system of KCPL, on the Kansas City, Kansas, 161 kV system of KACY, on the Bolivar 161 kV system of EMDE, and on the 69 kV system of ASEC.

During transfer case conditions, no low voltages which exist in the base case are corrected and no low voltages which do not exist in the base case are created. During transfer case conditions, a few high voltages which occur in the WERE, KCPL, and KACY systems during base case are eliminated. During transfer case conditions, a few high voltages which do not occur during base conditions are created in the Bolivar area of EMDE and on the 69 kV system of ASEC. This is due to EMDE generation modeled as unable to operate in leading power factor. Further, scattered high voltages on largely radial 69 kV facilities appear as far south as the Shreveport vicinity in CESW.

During contingency conditions, the test level transfer does not relieve low or high voltages that exist without the transfer.

During contingency conditions, the test level transfer does not generally cause low voltages or high voltages. However, some outages during the test level transfer cause high voltages that do not occur without the transfer. These high voltages are in the vicinity of State Line Plant in the four state area and are a result of EMDE generation modeled as unable to operate in leading power factor.

Loss of Flint Creek generator causes high voltages on the 161 kV system in the Joplin area of EMDE. Loss of the Flint Creek generator constitutes loss of 165 Mvar of reactive load (the generator is operating 165 Mvar leading).

2000 Spring Peak

Loading Violations

During transfer case conditions, no SPP region transmission facilities exceed their normal ratings.

During contingency conditions, the test level transfer causes a few additional overloads that do not exist without the transfer. The Philips-S Philips Junction 115 kV line overloads by 2.8 percent and the Summit-Exide Junction 115 kV line overloads by 2.7 percent for the loss of Summit-E Mcpherson 230 kV line. This is due solely to the generation schedule used to effect the transfer.

During contingency conditions, the test level transfer does not relieve any overloads that exist without the transfer.

Voltage Violations

During transfer case conditions, voltage no violations are created or relieved.

During contingency conditions, the test level transfer causes some voltages below 95 percent of nominal on the WERE system in the Hutchinson/Newton area. This is due solely to the generation schedule used to effect the transfer.

During contingency conditions, the test level transfer relieves some widely scattered low voltages on WERE radial 115 kV and 69 kV facilities. This is caused by reducing the west-to-east flows on the WERE system such that the initial voltage on the system increases slightly.

2000 Summer Peak

Loading Violations

During transfer case conditions, no SPP region transmission facilities exceed their normal ratings.

During contingency conditions, the test level transfer overloads the Keene-S Alma 115 kV line circuit 1 overloads 2.5 percent for loss of JEC-E Manhattan 230 kV line. There is a mitigation plan in place for the Keene-S. Alma outage. The EMDE Joplin SW-Tipton Ford 161 kV line appears overloaded for the loss of the Atlas-Oak 161 kV line. The overload is an error and due to the line data not reflecting the rebuild planned by EMDE. The Joplin SW 161-69 kV transformer (EMDE) overloads for the loss of a variety of 69 kV lines in the vicinity of Neosho (EMDE). There is a mitigation plan in place for this facility.

Voltage Violations

During transfer case conditions, no voltage violations are created or relieved.

During contingency conditions, the test level transfer relives some voltages below 95 percent of nominal on the CESW system in the northeast Oklahoma area and 69 kV and 34.5 kV voltages in the EMDE area. This is due to additional reactive capability available at the State Line Plant.

During contingency conditions, the test level transfer causes some low voltages on the 69 kV and 115 kV systems of MIDW, SUNC, WERE, and WEPL in north central and northwest Kansas. This is due solely to the generation schedule used to effect the transfer.

2000 Fall Peak

Loading Violations

During transfer case conditions, no SPP region transmission facilities exceed their normal ratings.

During contingency conditions, the test level transfer does not cause additional overloads that do not exist without the transfer.

Voltage Violations

During transfer case conditions, no voltage violations are created or relieved.

During contingency conditions, the test level transfer does not cause additional low voltages that do not exist without the transfer.

2000/2001 Winter Peak

Loading Violations

During transfer case conditions, no SPP region transmission facilities exceed their normal ratings.

During contingency conditions, the test level transfer does not cause additional overloads that do not exist without the transfer.

Voltage Violations

During transfer case conditions, no voltage violations are created or relieved.

During contingency conditions, the test level transfer does not cause additional low voltages that do not exist without the transfer.

2003 Summer Peak

Loading Violations

During transfer case conditions, no SPP region transmission facilities exceed their normal ratings.

During contingency conditions, the test level transfer does not cause additional overloads that do not exist without the transfer.

Voltage Violations

During transfer case conditions, no voltage violations are created or relieved.

During contingency conditions, the test level transfer relieves some voltages below 95 percent of nominal on the CESW system in the northeast Oklahoma area and 69 kV and 34.5 kV voltages in the EMDE area. This is due to additional reactive capability available at the State Line Plant.

During contingency conditions, the test level transfer causes some low voltages on the 69 kV and 115 kV systems of MIDW, SUNC, WERE, and WEPL in north central and northwest Kansas. This is due solely to the generation schedule used to effect the transfer.

2003/2004 Winter Peak

Loading Violations

During transfer case conditions, no SPP region transmission facilities exceed their normal ratings.

During contingency conditions, the test level transfer does not cause additional overloads that do not exist without the transfer.

Voltage Violations

During transfer case conditions, no voltage violations are created or relieved.

During contingency conditions, the test level transfer does not cause additional low voltages that do not exist without the transfer.

2005 Summer Peak

Loading Violations

During transfer case conditions, the Aurora-Monett 161 kV line (EMDE) overloads by 4.6 percent. There is a mitigation plan in place for this facility.

During contingency conditions, the test level transfer causes the Pentagon 161-115 kV transformer (WERE) to overload by 2.0 percent for the loss of the Stranger Creek 345-115 kV transformer (WERE). There is a mitigation plan in place for this facility.

Voltage Violations

During transfer case conditions, no voltage violations are created or relieved.

During contingency conditions, the test level transfer does not cause additional low voltages that do not exist without the transfer.

2005/2006 Winter Peak

Loading Violations

During transfer case conditions, no SPP region transmission facilities exceed their normal ratings.

During contingency conditions, the test level transfer does not cause additional overloads that do not exist without the transfer.

Voltage Violations

During transfer case conditions, no voltage violations are created or relieved.

During contingency conditions, the test level transfer does not cause additional low voltages that do not exist without the transfer.

2008 Summer Peak

Loading Violations

During transfer case conditions, no SPP region transmission facilities exceed their normal ratings.

During contingency conditions, the test level transfer causes:

The Plymel-Holcomb 115 kV line (SUNC) to overload by 0.7 percent for the loss of the PK_GOAB-Fletcher 115 kV line (SUNC). Without the transfer, the contingency loads the line to 100 percent of emergency rating. This facility is not part of the SPP Regional Tariff.

The Chisolm-Ripley 69 kV line (WERE) to overload by 2.7 percent for the loss of the Evans-Colwich 138 kV line (WERE)

The Harrisonville 161-69 kV transformer (MIPU) to overload by 0.5 percent for the loss of the Martin City 161-69 kV transformer (MIPU). Without the test level transfer, the contingency loads the transformer to 100 percent of emergency rating. The transformer has a normal and emergency rating of 50 MVA. This facility is not part of the SPP Regional Tariff.

Voltage Violations

During transfer case conditions, no voltage violations are created. During transfer case conditions, a low voltage at Mill 161 kV (SPRM) is relieved.

During contingency conditions, the test level transfer causes additional low voltages that do not exist without the transfer on the 69 kV and 115 kV systems of MIDW, SUNC, WERE, and WEPL throughout west central and northwest Kansas. This is due solely to the generation schedule used to effect the transfer.