SPP Southwest Power Pool

System Impact Study for Transmission Service Requests

from

UTILICORP UNITED

Missouri Public Service
Empire District Electric Co.
St.Joseph Light and Power Co.

SPP Transmission Planning
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Schedule No. 7

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I. Executive Summary

Southwest Power Pool evaluated the impacts of the 10-year network service requests for UtiliCorp (OASIS #163522-MPS, #163526-EDE, #163530-SJLP). Multiple power flow model cases were developed and reviewed during the analysis portion of the study. The engineering results of the study show that facility upgrades and system improvements are required to accommodate the requested transmission service from the designated resources to the designated load.

The study was performed in two parts. The first part studied the existing system representation in the power flow model to determine what thermal overloads and voltage violations are present. All potential violations were reviewed with the transmission owner and a summary of these results is provided in Sections V and VI. UtiliCorp and SPP Criteria were used to determine what violations exist.

The second part studied the transfer of power between the three existing control areas. This determines the capability of the SPP transmission system to handle the new dispatch alternatives posed when the three control areas are combined. Selecting two exporting control areas and transferring power to the remaining control area was the technique used. Generator sensitivity analysis was then performed on the exporting and importing areas separately creating 2 runs for each of the 3 control areas in every power flow model. This provides a comprehensive review of possible generation dispatch for the power flow model represented. An attached Excel spreadsheet shows the summary results of the study. UtiliCorp removed its facilities from the list because of redispatch solutions available to alleviate overloads. The analysis shows that some facilities are required to allow for 200 MW transfers between the existing control areas.

II. Introduction

UTILICORP UNITED has requested multi-year Network transmission service on the SPP OASIS (163522-MPS, 163526-EDE, 163530-SJLP). There are three operating companies in Missouri: MIPU, SJPL, EMDE. The three companies currently operate independently but for the purposes of this study are to be considered one control area. Therefore, the three System Impact Study requests (SPP-2000-006, SPP-2000-008, SPP-2000-009) were combined into one study. The period of the request is from 10/01/00 to 10/01/10. This system impact study was required in order to determine the capability of the transmission system for the requested period.

The principal objective of this study is to determine if the SPP transmission system is capable of supplying network service to the UtiliCorp companies in Missouri operating as a single control area.

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III. Study Methodology

The analysis was done to ensure current SPP Criteria and NERC Planning Standards requirements are fulfilled. The Southwest Power Pool (SPP) meets the NERC Planning Standards, Table No. 1, which provides the requirements related to thermal overloads with a contingency. It requires that all facilities be within emergency ratings after a contingency.

1. Description

This study was done in two different parts. The first part was to study the 12 base cases to determine existing thermal overload and voltage problems. The SPP base case models were modified to reflect the most current modeling information. One branch or selected multiple branches were removed to study the affect on the system. Thermal overloads along with high and low voltages were recorded during the contingency analysis using AC solution and reported in Section V and VI.

The second part was done using PTI MUST to see what problems showed up for transfers up to 200 MW between the three existing Missouri companies. The MUST program performs a DC linear analysis of transfers. A generation sensitivity analysis (GSA) feature in MUST was used for determining what levels of transfers can be achieved between the existing three control areas. The GSA uses all available generation in the exporting control area as a base case transfer. Then each unit or groups of units are tested to determine the minimum level of transfer that can be obtained without any thermal overloads. This provides a complete review of all possible dispatch situations for transfers between the control areas. Overloads in the base case were ignored in the MUST runs since they are covered in the ACCC analysis portion in part one. The attached Excel spreadsheet summarizes the results of the study.

2. Model Updates

Cases for year 2000 Fall Peak, 2000/01 Winter Peak, 2001 April, 2001 Spring Peak, 2001 Summer Peak, 2001 Fall Peak, and 2001/02 Winter Peak, 2004 Summer Peak, 2004/05 Winter Peak, 2006 Summer Peak, 2006/07 Winter Peak, and 2010 Summer Peak were included. These cases were modified to reflect future firm transfers not already included in the January 2000 base case series.

3. Study Analysis

Using the created models and the ACCC function of PSS\E, single and select double contingency outages were analyzed. This function uses a full AC solution technique.

PSS/E CHOICES IN RUNNING LOAD FLOW PROGRAM AND ACCC

BASE CASES:

Solutions - Fixed slope decoupled Newton-Raphson solution (FDNS)
A. Tap adjustment - Stepping
B. Area interchange control - Tie lines only
C. Var limits - Apply immediately

D. Solution options - X Phase shift adjustment
_ Flat start

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_ Lock DC taps
_ Lock switched shunts

ACCC CASES:

Solutions - AC contingency checking (ACCC)

A. MW mismatch tolerance -1.0
B. Contingency case rating - Rate B
C. Percent of rating - 100
D. Output code - Summary
E. Min flow change in overload report - 1mw
F. Excld cases w/ no overloads form report - YES
G. Exclude interfaces from report - NO
H. Perform voltage limit check - YES
I. Elements in available capacity table - 60000
J. Cutoff threshold for available capacity table - 99999.0
K. Min. contng. case Vltg chng for report - 0.02
L. Sorted output - None

Newton Solution:
Tap adjustment - Stepping
Area interchange control - Tie lines only
Var limits - Apply automatically
Solution options - X Phase shift adjustment
_ Flat start
_ Lock DC taps
_ Lock switched shunts

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