SPP Southwest Power Pool

System Impact Study for Transmission Service Request from ERCOT E to Central and Southwest

SPP Transmission Planning

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Executive Summary

Tenaska has requested a system impact study for long-term firm point to point transmission service from ERCOT E to CESW. The transaction period is from 1/1/01 to 1/1/02. The request is for two 50MW reservations (143371, 143372) totaling 100 MW for the entire period.

The principal objective of this study is to identify system problems and potential system modifications necessary to facilitate the additional 100 MW transfer while maintaining system reliability.

The analysis in this document shows that to accommodate an additional 100 MW transfer, no upgrades will be required on the SPP transmission systems. SPP has existing long-term firm service customers with a reservation priority for this requested transmission service as described in section 2.2 of the SPP Open Access Transmission Service Tariff. SPP will extend full priority rights to existing customers prior to contracting with new eligible customers.

The SPP and effected member companies shall use due diligence to coordinate the addition of necessary facilities or transmission system upgrades to provide the requested transmission service. Tenaska is to compensate SPP for such costs pursuant to the terms of section 27 of the SPP Open Access Transmission Tariff. Expedited procedures for new facilities are available to Tenaska per section 19.8 of the SPP Open Access Transmission Service Tariff.

Engineering and construction of any new facilities or modifications will not start until after a transmission service agreement and/or construction agreement is in place and effected member companies receives the appropriate authorization to proceed from the SPP after they receive authorization from the transmission customer.

Introduction

Tenaska has requested an impact study for transmission service from ERCOT E control area with a sink of CESW.

The principal objective of this study is to identify the restraints on the SPP Regional Tariff System that may limit the transfer to less than 100 MW. This study includes steady-state contingency analysis (PSS/E function ACCC) and Available Transfer Capability (ATC Linear) analysis.

The steady-state analysis considers the impact of a 100 MW transfer on transmission line loading and transmission bus voltages for outages of single transmission lines and autotransformers on the SPP system.

ATC analyses shows the amount of First Contingency Incremental Transfer Capabilities (FCITC) between the given study systems and what the limitations are, if any, for transferring up to 100 MW.

Study Methodology

SPP has used methodologies consistent with SPP and NERC requirements.

This study was done in two different parts. The first part was to study the steady-state analysis impacts caused on the SPP system from the 100 MW transfer identified and the second part was to study Available Transfer Capability (ATC). The SPP base case models were modified to reflect the most current modeling information.

The steady-state analysis part was done to ensure current SPP Criteria and NERC Planning Standards requirements are fulfilled.

The Southwest Power Pool (SPP) Criteria states that the following conditions be met in order to maintain a reliable and stable system.

1) More probable contingency testing .... shall conclude that

    a) All facility loadings are within their emergency ratings and all voltages are within their emergency limits (0.90-1.05 per unit) and
    b) Facility loadings can be returned to their normal limits within four hours

2) Less probable contingency testing .... shall conclude that

    a) Neither uncontrolled islanding, nor uncontrolled loss of large amounts of load will result.

More probable contingency testing is defined as losing any single piece of equipment or multi-circuit circuit transmission lines. Less probable contingency testing involves the loss of any two critical pieces of equipment such as 345kV autotransformers and generating units or the loss of critical transmission lines in the same right-of-way.

The NERC Planning Standards, Table 1, provides the strictest requirements related to thermal overloads with a contingency. It requires that all facilities are within emergency ratings after a contingency.

The ATC study portion was done using the requirements specified in the current SPP Criteria related to determination of ATC. The linear analysis was first performed using the PSSE TLTG activity. The results were AC verified and validated.

When facilities were identified as being overloaded the facility owners were asked to review and confirm the validity of the limit. During this review the transmission providers would use available mitigation plans.

SPP built two models for each season representative of the system with and without the requested transfer. Cases for year 2000 winter peak, 2001 spring, 2001 April, 2001

summer, 2001 fall, and 2001 winter were included. These cases were modified to reflect future firm transfers not already included in the January 2000 base cases.

Using the created models and the ACCC function of PSS\E, single and select double contingency outages were analyzed. Then full AC solution was to obtain the most accurate results possible. Any facility, which overloaded using MVA ratings in the transfer case and was not overloaded in the base case, was flagged.

Shown in table 1 are the outages that caused overloads and the upgrades needed to solve the overloading problems in the appropriate year cases.

PSS/E CHOICES IN RUNNING LOAD FLOW PROGRAM AND ACCC

BASE CASES:
Solutions - Fixed slope decoupled Newton-Raphson solution (FDNS)
1. Tap adjustment – Stepping
2. Area interchange control – Tie lines only
3. Var limits – Apply automatically
4. Solution options - X Phase shift adjustment
   _ Flat start
   _ Lock DC taps
   _ Lock switched shunts

ACCC CASES:
Solutions – AC contingency checking (ACCC)
1. MW mismatch tolerance –1.0
2. Contingency case rating – Rate B
3. Percent of rating – 100
4. Output code – Summary
5. Min flow change in overload report– 1mw
6. Excld cases w/ no overloads form report – YES
7. Exclude interfaces from report – NO
8. Perform voltage limit check – YES
9. Elements in available capacity table – 60000
10. Cutoff threshold for available capacity table – 99999.0
11. Min. contng. case Vltg chng for report– 0.02
12. Sorted output – None

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

Table No. 1: ERCOT E TO CESW Transmission Service Study – 100 MW

Study Year	Load flow case description (opened branch(es))	Overloaded lines	% load	Solutions
00WP	All Studied Contingencies	NONE	-----	
01SR	All Studied Contingencies	NONE	-----	
01AP	All Studied Contingencies	NONE	-----	
01SP	All Studied Contingencies	NONE	-----	
01SP	All Studied Contingencies	NONE	-----	
01SP	All Studied Contingencies	NONE	-----	
01FA	All Studied Contingencies	NONE	-----	
01WP	All Studied Contingencies	NONE	-----	

Available Transfer Capability Existing System

ATC studies were run. The purpose of these studies was to ensure that the desired power transfer (100 MW) could be accomplished while maintaining system reliability.

The results for the studies have shown no additional problems.