

TITLE: Finney-Hitchland-Potter 345kv lines outages

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1.0 PURPOSE:

The purpose of this guide is to describe transmission usage curtailments and define acceptable operating conditions for the SPS system when the 345 kV line from Finney to Hitchland or the 345 kV line from Hitchland to Potter is out of service.

2.0 BACKGROUND:

2.1 Normal and contingency conditions

- 2.1.1 The SPS system has two 345kv, one 230kv, and three 115kv connections to the Eastern Interconnect. These connections enable certain generating reserve and internal flow practices that must be modified if a line section in one of the 345kv connections is open. The outage of one of these lines weakens the SPS ties to the Eastern Interconnect such that the operating reserve requirement should be increased. Internal stability for flows from the north end to the south end of the system is also reduced. Finally, transmission capacity available for commercial imports and exports is reduced.
- 2.1.2 A PTDF flow gate has been defined to monitor and control the import flows into SPS. It is called SPPSPSTIES. It is flow gate number 5247.
- 2.1.3 A PTDF flow gate has been defined to monitor and control the flows from the north end to the south end of the SPS System. It is called SPSNORTH_STH. It is flow gate number 5196

- 2.1.4 SPS and Public Service of Colorado have system integration rights to the transmission path between SPS and PSCO systems. Both companies have designated the other's generation fleet as a network resource. PSCO has 208 MW of transmission from a POR of SPS to a POD of LAM345. SPS has 210 MW of transmission from a POR of LAM345 to a POD of SPS. These transmission rights persist only while the Finney to Hitchland, Hitchland to Potter and Finney to Lamar 345kv lines are in service.
- 2.1.5 Municipal Energy Authority of Nebraska (MEAN) has 2 MW of firm network transmission rights from a POR of SECI to a POD of LAM345. These transmission rights persist only while the Holcomb to Finney and the Finney to Lamar 345kv lines are in service.
- 2.1.6 There are concerns about a possibility of transmission line overloads in the vicinity of Finney if Lamar HVDC continues to flow power while the Finney to Hitchland or the Hitchland to Potter line is out of service. So Lamar HVDC must be ramped to a zero schedule any time the Finney to Hitchland or the Hitchland to Potter 345kv line trips or is taken out of service.
- 2.1.7 There are concerns about a possibility of transmission line overloads in the vicinity of Finney if the generation interconnected at Hitchland continues to generate while the Hitchland to Potter 345 kV line is out of service. So the generation at Hitchland will be automatically disconnected from the system (via a Special Protection System at Hitchland) any time the Hitchland to Potter 345kv line is open. The generation will remain connected to Hitchland during an outage of the Finney to Hitchland line.

2.2 Control Variables and limit

The following limitations are placed on the SPS system during the outage of the Finney to Hitchland or the Hitchland to Potter 345kv line and associated outage of the Finney to Lamar 345kv line:

- 2.2.1 The sum of the flows on the internal tie lines from North to South is limited to 600MW:
- 2.2.2 Due to reduced import capability we strongly recommend that Load Serving Entities within the SPS balancing area protect their load by holding reserves within the SPS Balancing Area that can be implemented in 30 minutes sufficient to cover the loss of their single most heavily loaded unit. Contingency assistance from SPP can end as soon as 30 minutes after the generator trips
- 2.2.3 The import and export TTC's are recalculated by SPP. SPS System Operators will notify SPP Scheduling desk if the net scheduled interchange

between SPS and SPP exceeds either of those numbers. SPP will determine how to curtail transactions to reduce the net flow to those limits.

- 2.2.4 Interchange transactions on the MEAN, PSCO, or SPS network transmission service must be curtailed because the path is unavailable.
- 2.2.5 Lamar HVDC may remain energized by the Finney to Lamar line with only Lamar HVDC station power use while either the Finney to Hitchland 345kv or the Hitchland to Potter 345kv lines are out of service.
- 2.2.6 Lamar HVDC must be immediately ramped to a zero schedule when the Finney to Hitchland or the Hitchland to Potter line locks out. Testing the Finney to Hitchland or the Hitchland to Potter line and attempting to restore it to service shall take place after Lamar HVDC is ramped to a zero schedule.
- 2.2.7 Lamar HVDC must be ramped to a zero schedule prior to switching a planned outage of the Finney to Hitchland or the Hitchland to Potter 345kv line.
- 2.2.8 The generation interconnected at Hitchland must be ramped to zero output prior to switching a planned outage of the Hitchland to Potter 345kv line.
- 2.2.9 The outage of the Finney to Hitchland line reduces SPS import capability but not the ability to transmit energy from the wind farm at Hitchland to Potter. The SPPSPSTIES flow gate definition includes the Hitchland to Potter line as one of the monitored elements. The SPS system operator will coordinate actions with the SPP Reliability Coordinator to control flows on SPPSPSTIES without unduly curtailing the wind farm at Hitchland.

3.0 IMPLEMENTING PROCEDURES:

3.1 Real-time pre-contingency operation

- 3.1.1 Normal operations are allowed. Monitor Energy Interchange transactions between SPS and Lamar HVDC for use of the above-mentioned MEAN, PSCO and SPS Firm Network service. (SPS OASIS Reservation Numbers 1089911, 1256070, and 1256074)
- 3.1.2 The import limit while Finney to Hitchland or the Hitchland to Potter is out of service is 102 MW as calculated by SPP in January 2006. Request SPP recalculate import limits for planned Finney to Hitchland or Hitchland to Potter line outages if needed. Remind them that the import limit is a voltage stability limit, not a thermal limit.

3.2 Post-contingency operation

- 3.2.1 If the Finney to Lamar line stays energized after the Finney to Hitchland or the Hitchland to Potter line locks out, the Lamar DC tie must be immediately ramped to a zero megawatt schedule by either the PSCO Transmission Operator or the SPS Transmission Operator, whichever is controlling Lamar HVDC at the time.
- 3.2.2 Notify Public Service of Colorado transmission operator that it was the loss of the Finney to Hitchland or the Hitchland to Potter 345kv line that required the Lamar HVDC to be ramped to zero.
- 3.2.3 If the Potter 345/230kv transformer trips, the protective schemes will lock out the Hitchland to Potter line and trip the connection to the generation at Hitchland. The Finney to Hitchland line will remain energized from Finney. The Lamar DC tie must be immediately ramped to a zero megawatt schedule by either the PSCO Transmission Operator or the SPS Transmission Operator, whichever is controlling Lamar HVDC at the time. Whether the Finney to Hitchland line is left energized will depend on the voltages and MVAR flows at Finney. The SPS system operator will coordinate the Finney voltage and MVAR flows with the SECI system operator.
- 3.2.4 Curtail Interchange Transactions moving on the Network Transmission Reservations listed in 3.1.
- 3.2.5 Pursue Finney to Hitchland or the Hitchland to Potter line testing and restoration only after curtailing Lamar HVDC. Line testing on the Finney to Hitchland line should be done so that the Sunflower Holcomb generator will not be subjected to a line fault. This will require line testing primarily to be done at Hitchland. Prior to testing from Hitchland, Hitchland generation may or may not be operating. Hitchland generation MW and or MVAR may need to be adjusted to get the Hitchland voltage low enough to test the line. After successful line testing from Hitchland, the Hitchland breaker needs to be opened, and then close the Finney breaker and then sync close the line at Hitchland. Testing the line from Finney shall be done only after coordinating with Sunflower, and Sunflower may require a line patrol before testing from Finney. Line testing of the Potter to Hitchland line should be done at Potter. Sync closing the Potter to Hitchland line will be done at Hitchland.
- 3.2.6 Post the line outage, recommendation for additional reserves, reduced NS flow limit, and reduced import limit as a message on the SPS OASIS. Post outage information on SPP OPS1. Notify SPP reliability coordinator of decreased stability limit for internal North to South flows and decreased import limit. Ask for TLR and/or SPP market curtailment assistance if necessary.

- 3.2.7 Remind SPP Reliability coordinator that import limit for SPS is reduced when Finney to Hitchland or the Hitchland to Potter is out of service. Request update of limits if necessary.
- 3.2.8 Notify Sunflower and Public Service of Colorado of facility status.
- 3.3.9 Notify Xcel Energy Markets and ACES Power by telephone that transmission is recommending holding increased reserves due to system conditions. Don't tell them the triggering event on the phone. The OASIS posting and Daily Log posting will provide the information they're looking for.