Operating Guide

XCEL 072205-7

TITLE: SPS Import Limits Operating Guide

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1.0 PURPOSE:

The purpose of this guide is to describe the SPS MW import limitation for an intact SPS system and actions to alleviate flow violations. Other specific Operating Guides have been published for outages to the Potter to Hitchland, the Hitchland to Finney and the Tuco to Oklaunion 345kv lines. See those Operating Guides for import flow limits when those elements are out of service.

2.0 BACKGROUND:

2.1 Normal and contingency conditions

The SPS system has two 345kv, 1 230kv, and 3 115kv lines connecting it to the Eastern Interconnect. Studies have shown that the limiting factor for imports of power into SPS from the Eastern Interconnect is low voltages on the tie lines. When a generator trips, power immediately flows into SPS from the Eastern Interconnect before any operator action can be taken. Therefore imports must be controlled to protect against unacceptable tie line voltages when a generator suddenly trips. The largest generators on the SPS system are the two Tolk Station units. Each runs at about 540 MW net when on line. So the sudden trip of a Tolk unit is the largest generation contingency for which we must allow.

Experience has shown that unfettered economic energy flows will cause imports into SPS from the Eastern Interconnect to exceed the reliability flow limit on the tie lines between SPS and the Eastern Interconnect. Economic imports must be limited to prevent unacceptable voltages on the transmission system after the sudden trip of a generator. Those imports include Interchange Schedules into SPS from other BAs in the Eastern Interconnect, Interchange Schedules wheeling power from the Eastern Interconnect to Blackwater and Eddy HVDC ties, and SPP EIS market exports to the SPS BA. Even though power flowing into SPS from Lamar HVDC is not from the

Eastern Interconnect, the electrical location of Lamar HVDC relative to the SPS tie lines requires that power imports from Lamar into SPS be treated as if they were coming from the Eastern Interconnect for voltage stability.

Output of the wind farm connected to the SPS system at Hitchland sub can flow towards Potter County and impact the import constraint. So the output of that wind farm must also be limited if necessary to protect the tie line voltages in case of a sudden generator trip.

2.2 Control Variables and limit

The following limitations are placed on imports into the SPS system.

2.2.1 The control variable is a flow gate has been defined for monitoring and control of these flows. It is defined as a PTDF flow gate named SPPSPSTIES. The flow gate's NERC IDC number is 5247. SPPSPSTIES is defined as the sum of the MW flows from Hitchland to Potter 345kv line, Liberal to Texas Co 115kv line, Elk City to Grapevine 230kv line, Shamrock to Mclean 115kv line, Jericho to Kirby 115kv line, Oklaunion to Tuco 345kv line.

2.2.2 Actual flows on SPPSPSTIES correlate closely with the net sum of Interchange Schedules between SPS and PSCO and between SPS and BAs in the Eastern Interconnect. Assuming Area Control Error and Lamar HVDC control error are zero; the difference between SPPSPSTIES physical flows and the net scheduled interchange with PSCO and with the Eastern Interconnection will be the SPPSPSTIES contribution from the wind farm connected to Hitchland substation.

2.2.3 For the purposes of manual generation re-dispatch to control the flows on SPPSPSTIES, the SPP RC can provide the Generator Shift Factors (GSF) for the wind farm connected at Hitchland and other generators for calculating their curtailment to relieve the SPPSPSTIES over flow.

2.2.4 The limit on the flow on SPPSPSTIES is 1134 MW to maintain acceptable transmission voltages. Allowing for the sudden trip of a Tolk unit reduces the allowable commercial flow to 594 MW.

2.2.5 The sudden loss of a generator may increase the imports into SPS above 594 MW. We will accept the risk of the sudden trip of another generator for the duration of a reserve sharing schedule from Southwest Power Pool. Upon expiration of that schedule we need to reduce import flows to the allowable limit.

2.2.6 The import limit is calculated periodically by Southwest Power Pool. The last update was March 1, 2009.

2.2.7 The tools available to the transmission operator to manage this flow gate in real time are NERC Transmission Loading Relief (TLR), SPP Market action, and generation re-dispatch in certain situations. The preferred order of implementation is TLR and then SPP Market action first, then generation re-dispatch. Generation re-dispatch will be implemented if TLR takes too long to implement or fails to provide the needed flow relief. Generation re-dispatch is available if the flow violation is due to a lack of market resources within the SPS BA while physical resources are available. The SPS operator shall consult with the SPP RC prior to taking action if possible to jointly arrive at a plan of action. If the situation doesn't allow time for prior consultation, the SPS operator shall report his actions to the SPP RC as soon as possible after taking action.

2.2.8 SPP criteria and NERC standards require that we notify SPP prior to a change in the flow limit due to a planned line outage.

2.2.9 SPP criteria and NERC standards require that we notify the SPP Reliability Coordinator when we exceed the flow limit, confer on the action to take to relieve the overflow, and agree on the action to take. If system conditions don't leave time for talking to the Reliability Coordinator prior to taking action, inform him as soon as reasonably possible after the action the taken.

3.0 IMPLEMENTING PROCEDURES:

3.1 Real-time pre-contingency operation

3.1.1 Normal operations are allowed. Monitor the sum of the flows on these lines. Monitor the sum of the net scheduled interchange with Southwest Power Pool, the net scheduled interchange with Public Service of Colorado, SPP EIS market flows, and the output of the wind farm interconnected at Hitchland.

3.1.2 Do not approve Interchange Schedules for more than 594 MW inbound net on the monitored interface. If PSE's attempt to over schedule the interface, request assistance from SPP for relief according to their tariff rules.

3.1.3 If we inadvertently overschedule the interface, request assistance from SPP in curtailing schedules to allowable level.

3.1.4 If the SPP EIS market flows are violating the flow limit or trending to violate the flow limit, request TLR assistance from the SPP Reliability Coordinator.

3.1.5 If the wind farm connected at Hitchland is contributing to the flow violation and its output isn't tagged for delivery to its customer, neither the NERC IDC or SPP market have a tool for curtailing the wind farm's output. The SPS System Operator will curtail the wind farm prior to calling for a TLR level 5 on SPPSPSTIES. The SPS System Operator will telephone the wind farm's control center to order the curtailment.

3.1.6 If the assistance requested in Sections 3.1.3 and 3.1.4 will take more than 30 minutes to implement or fails to correct the problem, order generation within the SPS BA to move as needed. If time permits, consult with the SPP RC to arrive at agreement on the generators to move.

3.1.7 If the import flow violation is due to a lack of market resources within the SPS BA and physical resources are available to meet the load or interchange schedule ramp and thus alleviate the import flow violation; order re-dispatch of the generation to alleviate the flow violation. Consult with the SPP Reliability Coordinator if possible prior to issuing the orders to arrive at agreement on the generators to move. Otherwise report your actions to the SPP Reliability Coordinator as soon as possible afterward.

3.2 Post -contingency operation

Generation Contingency

3.2.1 Carefully monitor conditions for the duration of a Reserve Sharing Group import schedule. If the reserve sharing schedule causes the import limit to be exceeded, talk to the SPP Reliability Coordinator to remind him that we are willing to allow the flow to persist for the duration of the reserve sharing schedule. That may require him to adjust the EIS Market system binding level for the SPPSPSTIES flow gate upward for the duration of the reserve sharing schedule. If there is adequate capacity in the SPS BA to cover the loss of generation prior to the end of the reserve sharing schedule, it would be beneficial to allow the SPP EIS market system to reduce the import flows to 594 MW. That circumstance would require working the SPPSPS flow gate binding level downwards towards 594 MW and allowing the EIS market system to adjust generation and reduce import flows below the previously scheduled reserve sharing assistance flow.

3.2.2 Verify net scheduled imports will be below the import limit when the reserve sharing schedules end.

3.2.3 If the import flow violation is due to a lack of market resources within the SPS BA and physical resources are available to meet the load or interchange schedule ramp and thus alleviate the import flow violation; order re-dispatch of the generation to alleviate the flow violation. The SPS operator shall consult

with the SPP RC prior to taking action if possible to jointly arrive at a plan of action. If the situation doesn't allow time for prior consultation, the SPS operator shall report his actions to the SPP RC as soon as possible after taking action.

Transmission Contingency

3.2.4 The Finney-Hitchland-Potter and Tuco to Oklaunion 345kv lines each have published Operating Guides published for the loss of those two lines. Implement the post contingency limits provided in the applicable Operating Guide for the loss of one of those lines. If either the Texas County to Liberal 115kv line, the Kirby to Shamrock 115kv line, the Kirby to Jerico 115kv line or the Grapevine to Elk City or the 230kv tie lines is out of service, system intact operating limits are in effect.

3.2.5 If the reduced flow limit due to an outage of the Potter to Finney or Tuco to Oklaunion 345kv lines is being violated or trending to a violation, implement the procedures listed in Section 3.1 of this Operating Guide.