

Southwest Power Pool, Inc.

VOLTAGE TASK FORCE

Face to Face Dallas TX AEP Office

Wednesday April 27, 2016 1:00 p.m. - 5:00 p.m.

Thursday April 28, 2016 8:00 a.m. - 12:00 p.m.

• Action Items and Voting Record •

- 1. Action Item: Validate that the 2021 MDWG considers all approved projects at that time including the clean power line.**
 - 2. Action Item: Discuss creating an Operational Modeling task force focused on EMS model with the ORWG.**
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- 1. Neal Faltys (Omaha Public Power District) moved to approve the VTF March 31, 2016 Meeting Minutes, and Mike Grimes (EDP Renewables) seconded the motion. The motion was approved without opposition or abstention.**

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• M I N U T E S •

Administrative Items / Attendance / Agenda Review

Chairman Mark Eastwood (City Utilities of Springfield, Mo) opened the VTF at 1:00 PM on 4/27/2016, and 8:00 AM on 4/28/2016.

Harvey Scribner (Southwest Power Pool) called attendance.

Mark Eastwood reviewed and set the agenda, Mark stated a closed session for TOPs only would be held during the last hour on Thursday 4/28/16. Jason Tanner (Southwest Power Pool) stated that closed sessions would be kept to a minimum, and the VTF would be discussing confidential information regarding mitigation plans between TOPs.

Consent Agenda

Neal Faltys (Omaha Public Power District) moved to approve the VTF March 31, 2016 Meeting Minutes, and Mike Grimes (EDP Renewables) seconded the motion. The motion was approved without opposition or abstention.

Approval Items and Staff Reports for Discussion

Agenda Item 5 – Operations Tools Data Requirement Accuracy/Weak point concerns

Lei Wang (Powertech Labs Inc.) gave a presentation over performing voltage stability analysis using DSA Tools. Lei discussed the technical and application aspects of voltage security assessment (VSA), he also discussed basic concepts, standards and criteria, methods for analysis, online dynamics security assessment, and recent enhancements. Lei stated that online DSA Tools can support PMU applications through visual overlays. Lei stated that PMU data is great for real-time, but is limited when forecasting. Lei discussed ICloud computing used by ISO NE to assess contingency analysis and unit commitment. Lei also discussed how DSA Tools integrates into market systems. Lei stated that DSA Tools has the capabilities to perform assessments with both DC and AC based market systems, and can handle both voltage and frequency analysis.

Agenda Item 6 – GE Modeling Techniques and Wind Study Results

Rob D'Aquila (GE Energy Consulting) gave a presentation over experiences from previous studies GE has been involved in, and how reliability was examined with changes to system generation mixes. Rob stated that current trends in generation are seeing more renewables, which results in less coal, nuclear, and gas. Rob stated that system operating conditions continue change, and in some areas the change is dramatic, where traditional constraints may no longer be limiting and new limitations are produced as the system evolves. Rob stated that accurate modeling is becoming more critical than ever as the system continues to change the generation mix. Rob stated that synchronous generation modeling is well understood throughout the industry in general, but renewable generation modeling is not and the expertise is located with the vendors. Rob discussed the trends present to operational reliability, which includes frequency response, stability, and short circuit strength. Rob stated that system response to the

loss of a large thermal unit is still the most critical event, but concerns should be raised if the prevailing systems resources are non-synchronous generation. Rob stated that short circuit strength can also degrade with lower synchronous levels of generation. Rob stated the he felt a mix of synchronous and non-synchronous generation was important for the reliability of the BES.

Agenda Item 7 – WIS Phase 2 Voltage Requirements/Approach

Harvey Scribner (Southwest Power Pool) discussed the Variable Generation Integration (VIS) Study Phase 2 voltage requirements. Harvey discussed the scope and assumptions, and stated that the VIS would assess the 2017 and 2021 spring topology. The study will assess light load conditions and apply historical transmission and generation outages. Harvey stated that the VIS would assess both 45% and 60% wind penetration, and adjust the SPP interchange to slightly importing. The VIS will use the GI queue to apply additional wind resources as necessary to achieve the 60% percent wind penetration level. To perform the voltage security assessment the VIS will utilize DSATools (VSAT) to find the point of instability using a real power reserve margin of 5%. Harvey stated that thermal limits will be honored, and the analysis will use a new module to curtail generation Remedial Action Optimal Powerflow (RA OPF). Harvey discussed using the NERC book of flowgates to monitor congestion, and stated that the redispatch priority for overloads and system collapse are thermal units followed by DVERs then NDVERs. Harvey also discussed the load pocket analysis and methodology.

Action Item: Validate that the 2021 MDWG considers all approved projects at that time including the clean power line.

Agenda Item 8 – Modeling Unit VAR Capability Curves

Mike Nugent (Southwest Power Pool) discussed modeling unit VAR capability curves. Mike provided background information and stated that a VAR capability curve represents a generator's MVAR Max and Min as a function of real power (MW) output. Mike stated that VAR capability is important for the Reliability Coordinator due to the increased accuracy of contingency analysis and better representation of forward-looking voltage studies. Mike discussed MOD-025-2 and stated that the standard requires monitoring our VAR reserves, and raised concerns that RTCA could potentially hide problems or show wrong results. Mike stated that Generator modeling is primarily driven by market registration, which determines Net vs. Gross and determines physical location and kV level. Mike also stated that not all units are modeled with GSU transformers. Mike discussed how SPP receives real-time telemetry for MW, MVAR, Control Mode, and AVR indication over ICCP, and stated that generators typically regulate the node they connect to where most units are modeled at the point of interconnection and regulate to a standard voltage schedule of 1.0 – 1.02PU. Mike discussed some challenges for modeling VAR capability curves, and commented that actual MVAR capability curve data is not readily available for all units, and noted that MOD-025-2 data is just now becoming available. Additional challenges were also noted that VAR curves are not stored in the Planning Model, and some data is based on measured tests verses data for the generator manufacture. SPP will continue to work with Members to acquire actual MVAR capability information, and SPP will update MVAR capabilities as MOD-025-2 test data is made available.

Action Item: Discuss creating an Operational Modeling task force focused on EMS model with the ORWG.

Agenda Item 9 – Transformer Tap Changer Settings

Mike Nugent (Southwest Power Pool) discussed modeling transformer tap changers. Mike presented background information into what a tap changer is and how it works. Mike stated that tap changers modify the number of coils used in the primary or secondary winding of a transformer. By doing this it modifies the turn's ratio of the transformer, and results in a change of voltage between the high and low side of the transformer. Mike discussed the different types of tap changers and how EMS handles them. Mike stated that currently SPP has several tap changers utilizing real-time measurements in EMS, and efforts are underway to bring more ICCP measurements into the solution. Mike also discussed the challenges and stated that tap changer ICCP comes in different formats from different TO's, where some send a 0-based range, and some send a -16 to 16 value. Mike stated that the accuracy of tap changer within the planning model is questionable. Mike stated that improvement efforts by EMS staff are underway to validate tap changer models, ranges, settings, and acquire available ICCP tap telemetry. Additional discussion was held over receiving tap positions from transformers currently in service that were not built with ICCP functionality, and several members stated it would be expensive, difficult, and potentially impossible to receive the information via ICCP.

Agenda Item 10 – ORWG approved Wind Integration Study, Recommendation

Jason Tanner (Southwest Power Pool) discussed the Wind Integration Study recommendations and noted that that staff has recently changed the study name to Variable Generation Integration Study (VIS). Jason discussed the action item from ORWG to develop a revision request that will require Voltage Control on new generation interconnection agreement, considering all fuel-types. Jason discussed the FERC NOPR to remove the exclusion of wind farm from providing voltage control for small generator interconnection agreements (SGIA) and large generator interconnection agreements (LGIA). Jason explained the differences between wind farm types 1- 5 using IEEE information, and stated that the task force should consider this information when discussing language regarding resource retrofitting. Mark Eastwood (City Utilities of Springfield, Mo) asked the group for three volunteers to assist with drafting a VTF driven RR to address the necessary SPP tariff changes to align with the FERC NOPR. Mike Grimes (EDP Renewables), Dustin Betz (Nebraska Public Power District), and Kevin Harrison (ITC Holdings Corp.) volunteered.

Agenda Item 8/9 Action Item Review

Action Item: Validate that the 2021 MDWG considers all approved projects at that time including the clean power line.

Action Item: Discuss creating an Operational Modeling task force focused on EMS model with the ORWG.

Action Item: Host a closed session for TF members at the face to face meeting. (Closed)

Action Item: VTF/SPP Staff should publish requirements for online VSAT in 2017 by January 1, 2017. (On Going)

Action Item: VTF to develop requirements for VS SOL. (On Going)

Agenda Item 10 Q&A/Open Forum

No additional items discussed

Agenda Item 11 – Meeting Schedule

- a. 5/26/2016, Net Conference, 0830-1200
- b. 6/29/2016, Net Conference, 0830-1200
- c. 7/27 – 7/29/2016, Face-to-Face, Kansas City (confirmed)
- d. 8/30/2016, Net Conference, 0830-1200
- e. 9/28/2016, Net Conference, 0830-1200
- f. 10/26/2016, Net Conference, 0830-1200

Agenda Item 23 – Adjourn

Chairman Mark Eastwood (City Utilities of Springfield, Mo) adjourned the VTF at 5:15 PM on 4/27/2016.

Chairman Mark Eastwood (City Utilities of Springfield, Mo) adjourned the VTF at 12:00 PM on 4/28/2016.

Respectfully Submitted,

Jason Tanner
Secretary



Operating Reliability Working Group
Meeting Attendance: 4/27/2016 - 4/28/2016
M=Member, G=Guest, S=SPP Staff, P= Proxy



Day 1	Day 2		Name	Status	Company
x	x	1	Chariman Mark Eastwood	M	City Utilities Springfield
x	x	2	Jim Useldinger	M	South Central MCN
x	x	3	Kevin Harrison	M	ITC Holdings Corp.
x	x	4	Sakshi Mishra	M	AEP Service Corporation
A	A	5	Mark Ahlstrom	M	NextEra Energy Resources, WindLogics
x	x	6	Feng (Kevin) Ma	M	Oklahoma Gas and Electric
P	P	7	Rouslan Tzartzev	M	EDP Renewables
x	x	8	Clinton Bruhn	M	Lincoln Electric System
x	x	9	Kyle Drees	M	Westar Energy
x	x	10	Dustin Betz	M	Nebraska Public Power District
x	x	11	Neal Faltys	M	Omaha Public Power District
x	x	12	Mike Grimes	P	Proxy for Rouslan Tzartzev
	x	13	Steve Gaw	G	The Wind Coalition
x		14	Jerry Bradshaw	G	City Utilities of Springfield
x	x	15	John Boshears (SPRM)	G	City Utilities of Springfield
x	x	16	Jeff Knottek	G	City Utilities of Springfield
	x	17	John Stephens (SPRM)	G	City Utilities of Springfield
x	x	18	Kyle Anderson	G	City Utilities of Springfield
	x	19	Chris Colson (WAPA-UGPR)	G	Western Area Power Administration
	x	20	Derek Brown	G	Westar Energy
	x	21	Bryn Wilson	G	Oklahoma Gas and Electric Co.
x		22	Jason Shook (GDS)	G	GDS Associates
x		23	Mike Wech	G	Southwestern Power Administration
x	x	24	John Allen	G	City Utilities of Springfield
x	x	25	Allan George	G	Sunflower Electric Power Corporation
x	x	26	Kyle McMenamin	G	Xcel Energy
	x	27	Robert Hirschak (Cleco)	G	Cleco
x	x	28	Casey Cathey	S	Southwest Power Pool
x		29	Temper Williams	S	Southwest Power Pool
x	x	30	Mike Nugent	S	Southwest Power Pool
x	x	31	Harvey Scribner	S	Southwest Power Pool
x	x	32	Jason Tanner	S	Southwest Power Pool
x	x	33	Neil Robertson	S	Southwest Power Pool