

**Final SATS TPSG Meeting
SWTC Offices
September 8, 2008**

Attendees:

Ron Belval, TEP
Bobby Chavez, TEP
Andy Meyer, TEP
Jim Rein, SWTC
Bruce Evans, SWTC
EvaMarie King, SWTC
Tom Wray, SWPG
Craig Hansen, Ft. Huachuca
David Bryan, SSVEC
Gary Romero, KRSA

On Phone Bridge:

Leonard York, Western

Agenda Items:

1) Welcome and Introductions

Ron welcomed everyone to SWTC offices and asked for introductions. He stated that this meeting is a working session that will aid in wrapping up the SATS Report, and to agree on which generation and transmission projects to include in the 2018 WestConnect Base Case.

This particular group, the Transmission Planning Sub-Group, has been tasked with looking at three areas:

- Greenlee to Vail
- South of Tucson
- West of Tucson

2) Confirm Objectives

- a. Generation and Transmission Project Assumptions for 2013 and 2018. A look at the studies that have been done for 2013 and slightly beyond show a number of problems and the goal is to determine which projects to include from 2014 to 2018. It is important that the group come to a conclusion on what generation and transmission projects will go into the WestConnect and ACC 10 Year Plans.

The WestConnect 2013 base case is finished and is ready for use. The WestConnect 2018 base case is currently being updated by SWAT with additional detail.

An additional task of the group is to provide information into the development of a 2009 SATS Study Plan.

David Bryan noted that there is a possibility of a 40 MW generator planned to be installed in the Sierra Vista area. It will primarily be used for peaking. David did not have any specifics to share with the group about this generation.

Andy Meyer noted that TEP has information about a solar power plant planned for installation in 2013 in Green Valley

Tom Wray pointed out that a good source of information on future generation plans are the utility 10 Ten Year Plans.

Ron noted that TEP has done some sensitivity analysis looking at generation at various sites, such as Winchester, Pinal West, Pinal Central and at locations internal to the TEP system. The initial look at the internal generation shows that this has the potential to defer some transmission projects for as long as five years in some cases..

Jim Rein noted that SWTC is aware of potential generation west of the Tucson mountains and at Winchester.

Craig Hansen noted that Ft. Huachuca has been mandated to supply up to 30% of its load by end use efficiency improvement and local renewables. He did not have any specific information to share as to how that would be done.

The group also agreed that the 2009 Study Plan will need to include a revised load forecast.

3) SATS TP SubGroup Review

- a. Issues. In the Greenlee to Vail area, the biggest issue is loss of the Express Line and the Winchester to Vail 345 kV line, as it overloads the SWTC 230 kV system. The solution ranges from building additional 345kV lines in parallel with the Express and Winchester to Vail 345kV lines, to building more 230 kV lines in parallel with existing 230kV lines and/or rebuild the existing 230 kV.

At the last meeting of the group, Jim had proposed a rebuild of Western's 115 kV line from Adams Tap to Nogales Tap, to 230 kV.

Another issue, but one which will be included in the 2009 study plan, is increased loads proposed by Freeport McMorrin at their Morenci and Safford mines.

In the area South of Tucson, TEP has looked at tapping the Vail to Bicknell 345 kV line to serve TEP load. Ron reiterated previous plans for SWTC, TEP and

Trico to investigate alternatives leading to a similar, but joint project involving 345/138/115 kV transformation.

In the area West of Tucson, Ron noted that most of the growth in this area is served by Trico. He also noted that SWTC will describe plans to integrate the 115kV systems owned and operated by CAP, SWTC and Western.

- b. Potential Solutions. Ron focused his attention on a map of the SATS planning area and stated that the solutions he will be discussing for TEP are for the 2018 time frame.

One fix for the double 345 kV outage in the Greenlee to Vail corridor is to build two parallel 345 kV lines from Winchester to Vail. With Bowie in service, a loss of the Willow to Winchester 345 kV line could be fixed by the addition of a 345 kV line from Willow to Winchester.

In addition to reinforcement between Willow and Vail, TEP is considering new EHV facilities such as a 345 kV substation at Irvington, with new 345 kV lines from Irvington to Vail and South. The combination of all of these projects (e.g. Willow – Winchester and Winchester – Vail, plus Vail – Irvington – South) help to increase TEP and SWTC load serving capability within the SATS load pocket. Local area 138kV and 115kV system improvements proposed by SWTC and TEP will coordinate with the proposed EHV projects.

In the area South of Tucson, TEP has begun evaluation of tapping the SWTC Bicknell to Vail 345 kV line with an interconnection to a new Hartt Substation.

Ron noted that these projects, assuming the Bowie generation is in service, would strengthen the EHV system at Winchester and Vail, thereby increasing the SATS load serving capability. Addition of generation plus transmission reinforcement in the area east of Tucson helps to defer the need for new 345 kV from Tortolita to North Loop for about ten years, or to 2028 time frame.

Deferral of plans for extending EHV from Tortolita to North Loop allows more time to evaluate the SPPR Three Terminal and other proposals should they arise. The 230 kV plan for SPPR will be more fully considered and addressed in the SATS 2009 Study Plan.

The 138 kV upgrades that are contemplated by TEP include the quad circuit from Tortolita to North Loop, and from North Loop and Vail into the Tucson load center. Note that one of the lines on the quad is the new SWTC 115kV Saguaro to Rattlesnake line.

The Pinal Central to Tortolita 500 kV line was represented in the cases that TEP used for their studies.

Tom asked about new 345kV lines from Pinal West considering reliability issues associated with 4 – 345 kV lines in a common corridor. Ron explained that bringing in 345 kV from the Northwest does not increase flow into the system assuming all lines are in service. This is part of the “null point” problem that was discussed at the last meeting. Ron conceded however, that flows from Pinal West would increase significantly under certain EHV contingencies.

A question was asked about upgrading the Western 115 kV line between Apache and Nogales Tap to 345 kV. Leonard stated that this could be done, but that there would need to be 345/115 kV stations in place to handle the existing 115 kV loads. He stated that the Right-of-Way is 100+ feet all the way from the Tucson area to Apache, but this needs to be verified. However, the group felt that a 100 foot ROW would probably not be adequate for 345 kV and suggested that this be an item to go into the 2009 study plan.

Jim Rein presented the projects that SWTC is contemplating for the 10 year plan submittals:

- 115 kV upgrades: Marana to Marana Tap, Marana to Avra, Avra to Sandario Tap and Sandario Tap to Three Points
- Replace Bicknell 345/230 kV transformer with a new 420 MVA unit (This delays the need for CS1 beyond 2018)
- Move existing Bicknell 345/230 kV 193 MVA transformer to Greenlee
- Redtail Substation 230 kV ring-bus addition
- 2nd 230/69 kV transformer at San Rafael

SWTC is also considering the SPPR 230 kV line coming into Marana. The Pinal Central to Tortolita Project is also of interest, but SWTC will need to have the ability to get out of Tortolita.

As an alternative to SPPR, SWTC has looked at siting new generation at Apache. While this is one possible solution, the initial studies show that generation sited at Apache in quantities higher than 140 MW will require SWTC to upgrade portions of its 230 kV system.

SWTC is also considering upgrading the Apache to Hayden 115 kV line, of which the Apache to Winchester portion is already insulated for 230 kV operation and tying it into Winchester. However, this will depend on what AEPCO does for its resource needs.

When asked about the CAP system tie-ins to the SWTC system, Jim replied that this work will be done in the 2009-2010 construction work plan. This is part of the Quad circuit that Ron talked about earlier.

SWTC is working towards expanding its ability to get to the markets for the benefit of AEPSCO and its member owners. These markets are Palo Verde, Pinal West, Pinal Central and to a lesser extent, Greenlee.

4) Presentation of Preliminary Study Results and Proposal

- a. Greenlee to Vail corridor, South of Tucson, and West of Tucson. Bobby Chavez presented preliminary results of study work directed at efforts to delay EHV transmission investments for as long as possible. He discussed some studies that he has done as it regards the proposed rebuilding of the Western 115 kV line to 230 kV. He stated that upon loss of the Express Line and Winchester to Vail 345 kV lines, more power flows on the Western rebuilt 230 kV line. Because of this increased flow, he is still seeing issues from Apache to Butterfield. Ron noted that this outage causes flows to go from the SWTC 230 kV system up to the 345 kV system at Bicknell. This phenomenon appears to be a characteristic of topology consisting of two lines, one a 230kV line (Apache – Bicknell) and the other a 345kV line (Vail – Bicknell), interconnected by a 230/345kV transformer at Bicknell.

Assuming the Willow interconnection for the Bowie project is in service, one way to mitigate the double 345 kV outage is to loop the Express line into Willow. The interconnection with the Express line would be operated “Normally open”, and automatically close only during emergency conditions. Another solution is a third 345 kV line from Winchester to Vail.

b. Generation Options

1. Bowie. Tom gave a Power Point presentation for his update. He stated that he would be discussing a status update for Phase I of the project.
 - Location: Bowie, Arizona
 - Size: 500 MW (Two CTs and One ST)
 - Interconnection point: Willow Substation loop-in of Greenlee-Winchester 345 kV line
 - Transmission Service Request: 300 MW scheduled to Palo Verde Hub
 - Planned COD: Summer 2011. Tom clarified that 2011 is when the Bowie to Willow double-circuit 345 kV line and Willow station will be in-service. The Bowie power plant scheduled COD has been revised to Summer 2012.

Tom stated that work is still needed, related to the System Impact Study to resolve the loss of the Express Line and the Winchester to Vail 345 kV lines.

The summary of the Power Flow results is as follows:

- Addition of BPS (Bowie Power System) does not cause any Two County issues
- RLG Requirements do not increase
- TEP average 138 kV bus voltage not affected
- No new Category A loading issues
- Two Category B overloads for loss of Winchester-Vail (Butterfield-apache 230 kV line & Bicknell 345/230 kV transformer)
- Two existing Category B overloads to exacerbate (Greenlee or Copper Verde 345/230 kV Transformer for loss of other)
- Bus voltage deviation violations not impacted

Tom then discussed the SIS mitigation summary which showed that the installation of an SPS, which would trip one CT and then the ST, would resolve most of the outage conditions.

Next Steps:

- Complete Facility Study by 12/31/08
 - Finalize Mitigation Requirements for critical contingencies
 - Special Protection Scheme
 - Loop-in of Springerville-Vail into Willow for N-1 emergency use only
 - Finalize Interconnection Agreement (date to be determined); possible CEC amendment.
2. SPPR. Gary Romero distributed the Three-Terminal Plan diagram for SPPR. The plan is to site a 650 MW Combined Cycle unit somewhere in Pinal County.

Circuit 1 starts at Santa Rosa and follows the existing PV-SEV 500/230 kV line along I-8 and then goes south where it will become a 230kV insulated double-circuit of Western's 115 kV line to ED5. The double-circuit will be 230 kV, with the Western line operating at 115 kV, to maintain continuity of the Western Parker-Davis system.

Circuit 2 is a 230kV insulated double-circuit of Western's 115 kV line from ED5 to ED2

Circuit 3 is a 230kV insulated double-circuit of Western's 115 kV line from ED5 to Saguaro up to I-10, but then heads south until it connects up with the Western line from Saguaro to Marana Tap, and it will be a double-circuit 230 kV line to Marana Tap, with the Western line operating at 115 kV.

Gary mentioned the conflict of the proposed SATS Strategy of building 345 kV from Tortolita to Marana in the same ROW as the proposed SPPR double-circuit 230 kV line to Marana. For this reason, a joint task force has been formed to look at options. So far, three have been developed:

- Option 1 is the SPPR Option as noted above from ED5 to Marana
- Option 2 is the SATS Option, but is a hybrid of a double-circuit 345/230 kV once you get to the Western line that goes from Saguaro to Marana. However, there are ROW issues to resolve along with how to keep the Western system whole
- Option 3 is to build the 230 kV now to Marana and then upgrade it later to 345 kV

The Task Force will use the TEP saturated load cases to look at these options.

Ron asked about SWTC plans for the 230 kV after it gets to Marana. He reminded the group that the proposal for two 345kV lines from Tortolita to North Loop along separate corridors was predicated upon the assumption that this would be a joint SWTC/TEP project. Otherwise, when it is determined to be needed, alternatives such as double circuit 345kV or 500kV lines along the TEP corridor would be investigated.

Since it appears that EHV additions into North Loop may be deferred for a substantial period of time, efforts looking into extending 230kV from the Marana terminus as proposed by SPPR makes sense now. Therefore the group agreed that this needs to be looked at in the 2009 Study Plan.

Summary of items for 2009 SATS Study Plan

- Revise load forecast.
- Investigate implications of Freeport McMoran increased loads in SATS study footprint.
- Develop and evaluate 230kV and other alternatives to Willow – Winchester – Vail 345kV parallel circuits. This would include an assessment of the Western 115kV corridor to determine the feasibility of 230kV or 345kV lines.
- Investigate alternative configurations to mitigate high post-EHV contingency flows on the Apache – Bicknell 230kV line and 230/345kV Bicknell transformer.
- Develop and evaluate alternatives to Tortolita – North Loop 345kV based on SPPR Three Terminal proposal.
- Investigate impact of SunZia in coordination with CATS EHV, NM, SWAT Renewable Transmission Task Force and other entities as required.

- Develop and evaluate alternatives for joint SWTC/TEP substation(s) to supply TEP/Trico loads south of Tucson.
- Continue Cochise County planning efforts as per 5th BTA recommendations.
- Sensitivities to be done with Green Valley Solar and other known solar and wind projects.
- Seek input from, and participation by Freeport McMorris to address their anticipated plant expansion.
- Others TBD.

5) Agree on Generation and Transmission Projects to Include in the WestConnect 2018 case

- Sawtooth Generation at ED5 (SPPR Three Terminal Plan) – 600 MW.
- SPPR Three Terminal Plan 230kV line from ED5 to Marana. Sawtooth Option 2 hybrid of a 345/230 kV circuit, which can be switched on and off in the 2018 case as needed.
- Pinal Central to Tortolita 500 kV line.
- Leave Western 115 kV system as 115 kV.
- Bowie Generation at 500 MW interconnected at Willow – without SunZia.
- Second Bowie Generation at 500 MW interconnected with SunZia at the Willow station, modeled in case, but switched off to be studied as a sensitivity.
- SunZia two-500 kV lines to Pinal Central, with one line interconnected at Willow. All to be switched off to be studied as a sensitivity.
- New 345 kV from Willow to Winchester – potential joint project with SWTC, TEP and others TBD.
- New Double-circuit 345 kV line from Winchester to Vail – potential joint project with SWTC, TEP and others TBD.
- Hartt Substation on the SWTC Bicknell to Vail 345 kV line.
- 138kV and 115kV additions and reinforcements to be provided by TEP and SWTC.

6) Next Steps/Meeting(s)

The next meeting of the group was not scheduled, but will be determined at the September 25th SATS meeting.