

JPA SWAT Short Circuit Study Group Update

July 12, 2006

Phoenix, AZ



Short Circuit Work affects System Reliability

- Relay Misoperations – Fail to Operate or Operate When They Shouldn't
- Equipment Damage due to Failure to Operate Relays
- Circuit Breakers and Other Equipment Failure because not Properly Rated



Power System Operational Reliability

- Correct Relay Operation
- Correct Breaker Ratings
- Reliability Depends on Accurate Fault Current Calculations

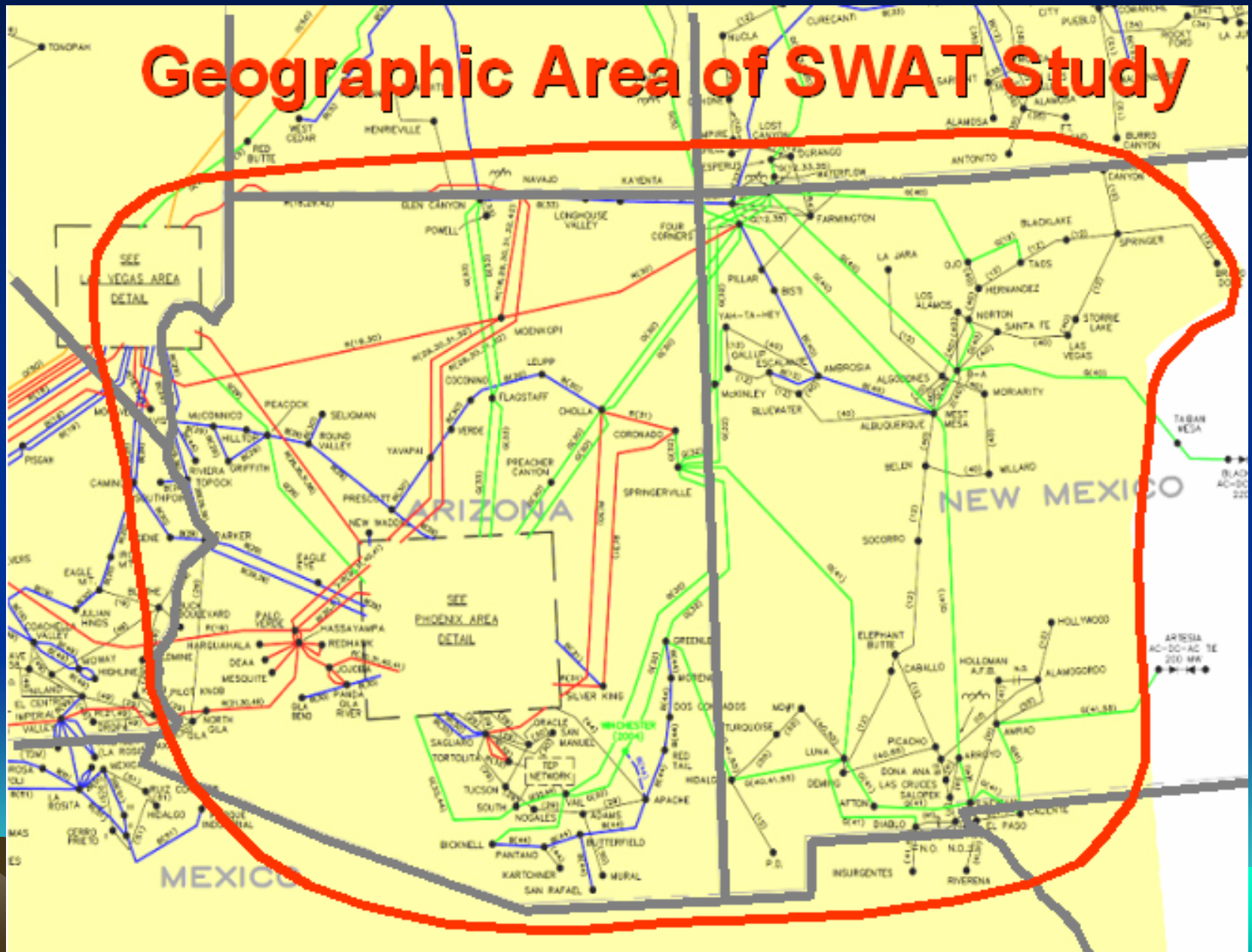


Reasons to Form Regional Short Circuit Working Group

- The interconnected system requires cooperation between everyone for accurate short circuit data.
- There was no formalized mechanism in place by WECC or other Arizona regional groups for coordination of the short circuit case



SWAT SCWG Footprint



4 Main Areas of Work

- Annual Operating Case
- Common Impedance Maps
- Common Study Methodologies
- Annual Standards Review



Annual Short Circuit Operating Case

- Improved Short Circuit Data for Relay Settings
- Improved Short Circuit Data for Breaker Duty Evaluations
- Improved Short Circuit Data for Safety Grounding and Arc Flash Evaluation
- Improved Reliability of System Operation and Safety of Maintenance Personnel



Common Impedance Maps

- Useful for seeing Short Circuit Case and Planning Case Updates
- One set of maps reduces duplication of effort
- Easy to make changes for annual operating case by marking drawings



Common Methodologies

- One set of breaker methodologies chosen for the jointly owned stations
- Other methods, such as safety grounding, etc. developed as guidelines
- Information sharing forum



Annual Standards Review

- Breaker Duty Studies, TRV Studies, Switching Studies, and Safety Grounding Studies based on standards
- Standards can change without a change in study methodologies
- Annual review of standards changes to determine if study methodology changes required



SWAT SCWG Accomplishments

- Webpage setup and linked to SWAT Website
- Charter (Scope) Finalized
- All SWAT Transmission Owners joined
- 6 meetings held since starting in January
- Monthly meeting schedule
- Impedance Map Plan Developed
- Working on Combining First Case



SWAT Webpage

Address  <http://www.azpower.org/swat/>



AZ POWER

Planning for Arizona's future

PV-PW

PW-SEV/BRG

SWAT

CATS STUDY

ABOUT SRP

NEWS UPDATES

- **Subgroups**
- **Meetings**
- **Maps**
- **Reports**
- **Members**
- **Related links**

Southwest Area Transmission

Purpose and vision statement

Southwest Area Transmission (SWAT) is comprised of transmission regulators/governmental entities, transmission users, transmission owners, transmission operators and environmental entities. The goal of SWAT is to promote regional planning in the Desert Southwest. The SWAT regional planning group includes four main subcommittees, which are overseen by the SWAT Oversight Committee.



SWAT subgroups

View a [draft description of SWAT subgroups](#).

SWAT Short Circuit Working Group (SWAT- SCWG)


The SWAT-SCWG meets every third Thursday of each month.

Contact Thomas Field at Field@wapa.gov for more information or visit the

Webpage Link

[SWAT-SCWG Web site](#)

SWAT SCWG Webpage

Address  <http://www.oatiaoasis.com/WALC/WALCdocs/page1.htm>



AZ POWER

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ABOUT SRP

NEWS UPDATES

Southwest Area Transmission Short Circuit Working Group

Purpose and vision statement

The Southwest Area Transmission (SWAT) Short Circuit (SC) Working Group is comprised of transmission owners, transmission operators, and other interested WECC stakeholders. The goal of the SWAT SC Working Group is to promote regional short circuit studies and common methodologies for individually and jointly owned/operated transmission systems in the Desert Southwest.

[Jointly Owned Transmission System Map](#)

SWAT SC Working Group Charter

Click the link below to download the SWAT SC Working Group charter.

[SWAT SC Working Group Charter](#)

- [Meetings](#)
- [Documents](#)
- [Cases](#)
- [Maps](#)
- [Task Forces](#)
- [Members](#)

SWAT Short Circuit Working Group Charter

Approved by the SWAT SCWG members on January 26, 2006

The Short Circuit Working Group will annually update a SWAT short circuit operating case which is detailed enough for each utility to use for determining correct fault currents for relay operation, correct fault currents for breaker duty evaluations, correct fault currents for safety grounds, and other uses each utility will have for accurate transmission and subtransmission fault currents.

Distribution generation and distribution motor loads which can affect these fault currents significantly will be modeled at the distribution level to obtain correct X/R ratios as well as determine AC decrements. In addition to maintaining an Annual Operating Short Circuit case which will be distributed in a common data format, the group will also determine common methodologies to be applied to breaker duty studies. Additionally, the group will develop common methodologies for safety grounding studies, TRV studies, capacitive switching studies, breaker failure studies, and other studies related to faults in jointly owned facilities.

This group will annually review IEEE, NEMA, NESC, and other standards which can affect these studies to determine if changes are needed in the study methodologies or equipment specifications. This group will also create task forces to develop fault cases for future joint planning studies which will need accurate fault calculations. This group will work with the utilities and loads on the boundaries of the stakeholder systems to develop accurate equivalents and representations to include in the Annual Short Circuit Operating case. This study group will provide updates to the SWAT Oversight Committee of the group's activities.

SWAT SCWG Webpage

Address



<http://www.oatioasis.com/WALC/WALCdocs/page1.htm#mem1>

SWAT SCWG Members

[Tom Field](#) WAPA

[Don Bryce](#) USBR

[Mark Etherton](#) SWRTA Class Two Consultant

[Steve Phegley](#) APS

[Maria Ramirez](#) SRP

[Gary Trent](#) TEP/Unisource

[Tom Spence](#) SWTC

[Steve Conrad](#) PNM

[David Barajas](#) IID

[Jorge Barrientos](#) IID alternate

[David Gutierrez](#) EPE

[Joe Trantino](#) - NPC/SPPC

[Bill Middaugh](#) - [CCPG](#) Liaison

SWAT SCWG Webpage



http://www.oatioasis.com/WALC/WALCdocs/page1.htm#meet1

SWAT SCWG Meetings

January 2006 Meeting [Notes](#)

February 2006 Meeting [Notes](#)

March 2006 Meeting [Notes](#)

April 2006 Meeting [Notes](#)

May 2006 Meeting [Notes](#)

June 2006 Meeting [Notes](#) (unapproved)

July 2006 [Agenda](#) (draft)

Impedance Maps Work

- Most Impedance Maps Are Out of Date
- List of Items to be Placed On Maps Developed
- A Single Set of Impedance Maps to be Generated
- Requested SWAT to Develop WestConnect Funding of Impedance Map Generation
- Only 2 WestConnect Members not Members of SWAT SCWG



SWAT SCWG Webpage



http://www.oatioasis.com/WALC/WALCdocs/page1.htm#map1

SWAT SCWG Impedance Maps

(All impedance maps are password protected)

2006 Combined Maps

WestConnect [Proposal](#)

Map Items [List](#) (draft 2)

APS Impedance [Maps](#)

SRP Impedance [Maps](#)

WAPA DSW Impedance [Maps](#)

TEP/Unisource Impedance [Maps](#)

SWTC Impedance [Maps](#)

IID Impedance Maps

EPE Impedance [Maps](#)

PNM Impedance [Maps](#)

NPC/SPPC Impedance [Maps](#)

SWRTA Impedance Maps

Combined Case

- Plan Developed
- Conversions Currently being Checked
- Zones for Members being Developed
- Equivalents to be Checked
- Cases to be Combined



Future Work

- Combine CCPG SCWG Case
- Combine STEP SCWG Case (if developed)
- Develop Common Methodologies
- Review of Standards
- Start on next Annual Case and Impedance Maps Update (refinements)



Future Refinements

- Add Mutual Coupling
- Add Line Charging Capacitance
- Add Motors
- Check Transformer, Line, Shunt, Generator, and Load Data



Questions?

