

## Slide 1

Good Morning. My name is Tom Field and I work for WAPA DSW. I will be giving you a brief Introduction and Update on the SWAT Short Circuit Working Group. I helped to start this short circuit working group for obtaining better data in our short circuit case. As you will see in this presentation, the benefits and reasons for having this working group are common to all members of SWAT and all members of the JPA.

## Slide 2

Short Circuit work has a direct affect on system reliability. If you do not have a good short circuit case that represents the system as accurately as possible, you can have relay misoperations. Besides unnecessary outages, if relays don't operate properly, you can have equipment damage. Finally, if you don't have good short circuit data, you can have equipment failure due to incorrect ratings.

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To have good power system operational reliability, you have to have correct relay operations and correct breaker ratings. This reliability is directly related to having accurate fault current calculations.

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We have such an interconnected system in the southwest that it requires cooperation between all the utilities to obtain and maintain accurate short circuit data.

## Slide 5

The Arizona area is encompassed by the SWAT footprint, so it was logical to form a short circuit working group which was under the SWAT organization for the formalized structure needed.

## Slide 6

The four main areas of work for the short circuit working group are the development of an annual short circuit operating case, development of impedance maps, development of common study methodologies, and an annual review of the standards that affect the common methodologies.

## Slide 7

An annual short circuit operating case will improve the reliability of the system operation and the safety of maintenance personnel.

#### Slide 8

The impedance maps are useful for easily showing the updates in the annual short circuit cases. In addition to the short circuit work, the data can also be useful for planning cases which usually contain a lot of preliminary design information instead of the as built information in the short circuit case. By having a set of common impedance maps, a lot of duplication by each utility making drawings with other utilities information will be eliminated.

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The group will develop common methodologies for short circuit applications in jointly owned substations.

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Since the methodologies are based on standards, an annual review of the standards will be performed to find changes that can affect the common methodologies.

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To date, the short circuit working group has setup a webpage and it has been linked to the SWAT webpage, the charter has been finalized, all of the SWAT transmission owners have joined, there have been 6 meetings held since starting in January, there is a monthly meeting schedule, the impedance map plan has been developed, and the group is working on combining the first case.

#### Slide 12

This is the link to the short circuit working group on the SWAT main page.

#### Slide 13

This is the SWAT SCWG webpage which is updated monthly.

#### Slide 14

This is the charter for the group. I am handing these out so you can read it. This is also on the SWAT SCWG webpage.

#### Slide 15

This shows a list of all the members and the primary contacts for each. There is a liaison with the CCPG short circuit group.

## Slide 16

You can download the meeting minutes with the presentations from the SWAT SCWG webpage.

## Slide 17

After looking at the maps, we found that most of them are out of date. We developed a list of items to be placed on a common set of impedance maps. We have requested funding from WestConnect for generation of a common set of impedance maps. WestConnect was chosen because all the SWAT SCWG members are WestConnect members. Only 2 WestConnect members are not members of the SWAT SCWG, but they are members of the CCPG short circuit group.

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The current impedance maps, the list of items to place on the common impedance maps, and the proposal developed by the group for WestConnect funding are on this page.

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We have developed a plan for combining the cases. This includes checking the conversions between different programs, defining zones of the members, checking the equivalent methods in different programs, and finally combining the cases into a single case. We are currently working on checking the conversions and defining the zones of the members.

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After the first combined case is made, the group will combine the CCPG case with the SWAT case. If STEP generates a case, the group will combine the STEP case as well. The common methodologies work has not started yet and the review of the standards affecting the common methodologies hasn't started yet. After this is all done, the next annual case and impedance map updates will be started.

## Slide 21

Future revisions will include refinements to the initial case. This will include mutual coupling, line charging capacitance, addition of motors, and checking/updating the other information in the case.

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Are there any questions?