SWAT SC Working Group Meeting
Thursday, May 19, 2006

Location: Santa Cruz Water and Power Office, Suite 2

Time: 9:30AM-12:00PM

Notes: Paul Dux, WAPA
A copy of the agenda, a list of attendees, and the distributed material is attached to the end of these notes.

1) **Introductions, Approval of Previous Meeting Minutes, and Update on Action Items**

Tom Field opened the meeting by stating that this meeting would be brief because the conversions had not been completed. Tom stated that after the meeting, SRP, APS, and WAPA would stay to continue work on the conversions. He stated that there was no phone connection for a teleconference, so there were not enough members for a quorum. He stated that because of this, the group would seek approval of the April meeting minutes at the June meeting. He stated that the only action item that he would give an update on was the arrangements for the meeting by Mark E.

There were 6 participants at the meeting. The list of participants is attached at the end of these minutes.

The agenda was distributed and is attached at the end of these minutes.

Tom stated that there were some new issues that should be mentioned before going to the next item on the agenda.

Tom stated that Paul Dux of WAPA had taken another position with WAPA and would not be working on the WAPA short circuit case in the future.

Tom stated that Gary Trent with TEP stated that he did not have the resources to be an active participant, but would attend some meetings via teleconference. Gary stated that he would provide any TEP data that the group would need. Tom stated that Gary stated that he would not be able to combine the final 2 cases. Tom stated that when the group reached the point of combining the final two cases, a volunteer would be asked for.

Tom stated that a CCPG member had provided a document from an April 13, 2006 CCPG meeting on the CCPG SCWG. This document is attached to the end of the minutes. Tom stated that since this did not come through the CCPG liaison, the SWAT SCWG should ask for a volunteer at the next meeting to be the SWAT liaison for the CCPG SCWG. He stated that this 2 way liaison should also be established for STEP after they start their SCWG.

Tom stated that a STEP presentation on forming a STEP SCWG had been given by Ron Moulton on May 5. He passed around an email from Ron dated 5/8/06 which stated "…The proposal was received favorably. …" As an action item, Tom stated that he would put a link to the presentation on the webpage as soon as STEP placed it on their webpage.

Tom stated that SRP met with APS and WAPA to discuss the conversion work on May 16 at SRP. He stated that Brian Keel of SRP (planning manager), Maria Ramirez of SRP (planning), Ted Stanton of SRP (protection), Johnny Hernandez of SRP (planning), Ed Marquez of SRP (protection manager), Ron Onate of APS, and Tom Field of WAPA attended the meeting. He stated that Ted S. of SRP would be retiring in August and that he would be concentrating on updating the mutual coupling until his retirement. His manager was not sure if the work in the group should be performed by protection or planning. A set of questions on the scope of the work, level of detail in the base case, estimated time for completion of work, and maintenance of future cases were answered with highlighted copies of the first meeting minutes and the charter. After discussions about the benefits of the work, SRP determined that the largest financial benefit from the work would be in the purchase of breakers which fell under planning. Therefore, SRP determined that Maria R. of SRP would be the single point of contact for the technical work and would perform the work needed for the conversions and combining of the cases.

Tom stated that he attended the IEEE Switchgear meeting in Galveston, Texas between May 8 and May 11. He stated that since this group was for sharing resources between the members related to short circuit work, he would give a summary of the meeting. He stated that he only attended meetings for the High Voltage Circuit Breaker Subcommittee.

Tom stated that C37.015 which is the Shunt Reactor Switching Guide was addressing ballot comments. He said that a new working group was formed for the next revision of the guide.

Tom stated that C37.04b and C37.09b are for TRV revisions. He stated that C37.04b is open for ballot until June 1. The working group is working on draft 2 of the amendment for C37.09b. Tom stated that he brought up the SLF d factor reduction. The chairman of the working group stated that the CIGRE working group A3-19 would present data on the SLF d factor that would be used for this discussion when they were finished with their work. The 1.5 first pole to clear factor for 3 phase faults is now an option, so the

reduction in the standards in 1999 and 2000 are now being reversed as an option for the ungrounded three phase fault TRV reduction of 15%.

Tom stated the C37.12.1 Instruction Book Guide was a new draft standard that was balloted by the committee. Most of the negative votes were from manufacturers. The group is trying to resolve the comments.

Tom stated the C37.016 Circuit Switcher Standard was now in the final stages of balloting. Tom stated that this will be a new standard for circuit switchers.

Tom stated that the task force on transformer limited faults is beginning to get some data on transformer FRA tests. This task force is trying to update the figure for estimation of effective capacitance in C37.011 using modern transformer designs. Tom stated that Brad Staley of SRP stated that he would put the test in the SRP transformer specification. Tom stated that FRA tests should be performed on transformers to be able to indicate after an incident whether there was movement of the coils. Tom stated that there may not be detectable cellulose breakdown after an incident such as an extended amount of time for fault current through a transformer. However, if FRA tests are performed to get a baseline on transformers prior to an event, then the movement of windings could be detected after an incident by running another FRA test and trigger a more detailed inspection that could prevent a transformer failure. Tom stated that Doble stated that they are booked for performing these tests for the next year, but they do sell the equipment for utilities to perform their own tests.

Tom stated that C37.06 was addressing ballot comments. Tom stated that C37.06.1 is now in an annex of C37.06. Tom stated that some higher continuous ratings were added at the meeting. Tom stated that the standard now has 80 kA ratings for 145 kV, 170 kV, and 245 kV breakers. Tom stated that the standard has 100 kA ratings for 170 kV breakers. Tom stated there were some capacitive switching rating issues in C37.06 brought up at the meeting that are unresolved.

Tom stated that a corrigenda for C37.04 and C37.09 was discussed for correcting the mistakes in the 1999 and 2000 versions of the standards. Tom stated that the group wanted to correct the last version of the standards that contained the 1-cos and the exponential waveshapes for historical purposes. Tom stated that the new standards will contain the IEC 2 and 4 parameter waveshapes instead of the exponential and 1-cos waveshapes.

Tom stated that the C37.12 Circuit Breaker Specification guide was addressing the 376 comments from the ballot. This will be a new standard. Tom stated that there are items that have to be specified for the correct capacitive switching requirements that are not apparent in the standards, but are explicitly stated in this new standard.

Tom stated that C37.011 was revised for the new TRV requirements. Tom stated the standard is now ANSI approved and was published on February 10, 2006. Tom stated

that the guide will have to be revised later for the IEC waveshape changes in C37.04b and C37.09b.

Tom stated that CIGRE WG A3-19 on TRV from 3 phase line faults had provided information showing that in some cases, another level on the TRV envelope may be needed. Tom stated that the chair of the group stated that when lines have no shielding, the 1.6 d factor may not be sufficient. Tom stated that the chair of the group stated that when lower voltage conductors are put on higher voltage line construction, the 1.6 d factor may not be sufficient. Tom stated that simulations were shown that indicated that for soil resistivity values below 20 ohm-meters, the 1.6 d factor may not be sufficient.

Tom stated that EPRI has consolidated all of their breaker research into a single area that can be found by going to transmission reliability and performance on the EPRI website, then substations, and then breakers. The direct link for the new breaker section of EPRI is: http://www.epri.com/portfolio/product.aspx?id=1471&area=37&type=10
Tom stated that the EPRI breaker group which met with the IEEE Switchgear Committee at this meeting may continue to meet with the IEEE Switchgear Committee in the future. Tom stated that they have 2 projects right now. Tom stated that Task Force 37F on circuit breaker condition assessment and life extension was started in 2005 and another project on using protection and metering equipment for circuit breaker diagnosis was started in March of 2006. Tom stated that project 37.016 was completed in 2005 and included a survey of breaker type, age, and maintenance for the end of life model. As an action item, Tom stated that he may put the presentation on the website or send it to those interested after contacting EPRI about distribution of the CD.

2) Aspen to CAPE Conversion

Ron Onate of APS stated that he had converted the Aspen DPV2 file to CAPE and compared all of the faults. He stated that there were 93 buses in Aspen that were not in the CAPE output of faulted buses. Ron stated that initially, there were 716 buses with a 10 A or higher difference. There were 493 buses with a 100 A or higher difference. Ron stated that Tom F. went to APS on May 17 with Aspen on a computer and spent the day trying to resolve the differences. Ron stated that it was found that CAPE did not have an option for setting the transformer taps and LTCs to unity. Therefore, Aspen would have to be rerun with this different setting to match. Ron stated that it was found that CAPE had to have "Use Zero Sequence Only Shunts" checked to make them match closer. Ron stated that it was found that CAPE had to have "Use LTC Taps" and "Use Fixed Taps" checked to make the two cases match closer. Both Aspen and Cape were run for all cases with ignore positive sequence shunts, ignore switched shunts, ignore loads, and ignore line charging capacitance. After the required changes in CAPE and Aspen were identified, the two cases were rerun. The comparison showed that there were 319 buses with 10 A or more difference. The comparison showed that there were 76 buses with 100 A or more difference.

Ron stated that the problems found so far were found by going to the highest difference and then comparing the fault current from each branch in CAPE to Aspen. He stated that

the branches that matched were outaged and the highest difference branch was faulted one bus back. He stated that this was done until the element that caused the difference was found. Ron stated that they had run out of time on May 17, so they did not finish checking all of the differences. He stated that he and Tom would get together again to finish finding the causes of all of the differences before the next meeting. A screenshot of the options required in CAPE needed to match the Aspen output is attached at the end of these minutes.

3) CAPE to Aspen Conversion

Maria Ramirez of SRP stated that she would be performing the comparisons. She stated that Ron had sent her a DXT file which was the CAPE DPV2 case being used by Ron and Tom for comparisons converted to Aspen with the CAPE conversion routine. She stated that she did not have an ASCII text format CAPE case for conversion with the Aspen routine. She stated that she compared the fault currents that Ron sent to her on April 25. She said that she found that there were 80 more buses in the Aspen output than in the CAPE output. She stated that there were large differences between the two outputs. She said that there were also some problems with the spreadsheet. She stated that as an example, Aquafria had 2 buses with the same name, but different voltage levels. She said that in the CAPE spreadsheet one was 13.8 kV followed by a 100 kV bus. She said that in the Aspen spreadsheet it was 100 kV followed by a 13.8 kV bus. Tom stated that she should use the "Sort Output by Bus Number" in Aspen Batch Short Circuit when she runs it. He said this will put the output in ascending bus number order which is the format the CAPE output was in. Ron stated that the sort could also be done in Excel. He stated that the 80 buses that were different could be easily identified by using the field in the spreadsheet that compared bus numbers in each case. Tom stated that after the meeting, both he and Ron would work with Maria to explain how to use the spreadsheet with the methods they had been using.

Maria said the file she used was the file that initially had 716 buses with 10 A or higher difference when compared to the Aspen case. Ron stated that he would send her another case to use for comparison after he and Tom had narrowed down the problems that could be taken care of with options in CAPE and Aspen. Maria said that she would make the comparisons after Ron and Tom were finished with the Aspen to CAPE comparison.

4) PTI to Aspen Conversion

Tom F. stated that he had been busy with the switchgear meeting and working with Ron on the Aspen to CAPE conversion, so he had not had time between meetings to perform more work on the PTI to Aspen Conversion. He stated that he would continue to work on this after the Aspen to CAPE and CAPE to Aspen conversion issues had been worked out since he would be involved with both. He stated that when Ron and Maria start to work on the CAPE to Aspen conversion, he would spend a day with both of them to help in the comparison and identification of the causes of differences.

5) Areas and Zones in Cases

Tom F. said that he sent out a list of the zones and areas used by each member in the latest WECC loadflow operating case on April 24. He stated that he only had 2 responses so far on what areas and zones people would be using. He stated that the group would have to have all of these before we start combining cases to make sure there are no duplicates. He stated that it would be better to use the WECC zones because when we start to combine our case with CCPG, STEP, and any others, it would be easier to ask the others to change their zones if we used the WECC zones. As an action item, Tom stated that he would place the final list of areas and zones on the website when he had a response from all of the members.

6) **Bus numbers in Cases**

Tom F. stated that the group should wait until the cases are ready to combine before discussing the bus numbers in the cases.

7) **Equivalents Update**

Tom F. stated that since the conversion issues had not been completely resolved, the equivalent work had not started yet.

8) **WestConnect/SWAT Maps Update**

Tom stated that on May 4, Rob K. sent an email that requested the SWAT SCWG to prepare a written proposal for the map work that would include:

Background
Scope of Work,
Estimated Cost
Schedule of Activities
Deliverables
Management of Work

Tom stated that a SCWG presentation was given by Rob K. at the SWAT Oversight Committee meeting on May 10. As an action item, Tom stated that he would put the presentation on the website after the meeting. Tom stated that Rob reported "… The study group plans to approach Westconnect on funding for the efforts associated with mapping the short circuit database. …"

Tom stated that on May 13, Rob K. sent out an email that stated "… CCPG does not want to coordinate a proposal for funding request from WestConnect. …". He stated that they would have to talk to Sierra to see if all of Nevada will be covered by the work. He gave a breakdown of percentages by company to apply to the total cost once it has been developed. Tom stated that this means the group will have to work on a draft proposal by the next meeting. As an action item, Tom stated that he would develop a rough draft to discuss at the next meeting.

9) **Determine Location of Next Meeting**

The determination of the next meeting location was discussed next. Tom stated that Steve Conrad of PNM had stated at the April meeting that he would look into hosting the June meeting in Albuquerque. He stated that he had not heard from Steve on this action item. As an action item, Tom stated that he would contact Steve to determine if the next meeting would be in Albuquerque. He stated that since the conversion work had not been completed, if the next meeting was not in Albuquerque, it should be in Phoenix. He stated that SRP hosted the previous meeting. Ron stated that he would not be able to host the next meeting at APS, but could host the August meeting at APS. Tom stated that he would make the arrangements for the next meeting at WAPA if it is not in New Mexico.

The meeting was adjourned at approximately 12:00 pm.

Note: Tom Field did not ask for permission to publish contact information in the meeting minutes on the website, so only the contact information from those that gave consent at the first meeting to publish their contact information on the website is published in the list from the May meeting.

SWAT SC Working Group

May18 2006
9:30AM to 4:00PM Pacific Time
Location: Santa Cruz Water and Power Office
Suite 2
410 E. Florence Boulevard
Casa Grande, AZ 85222

Meeting called by: SWAT SC Working Group

Purpose: SWAT SC Working Group meeting to review short circuit items of mutual interest for the SWAT system.

----- Agenda Topics -----

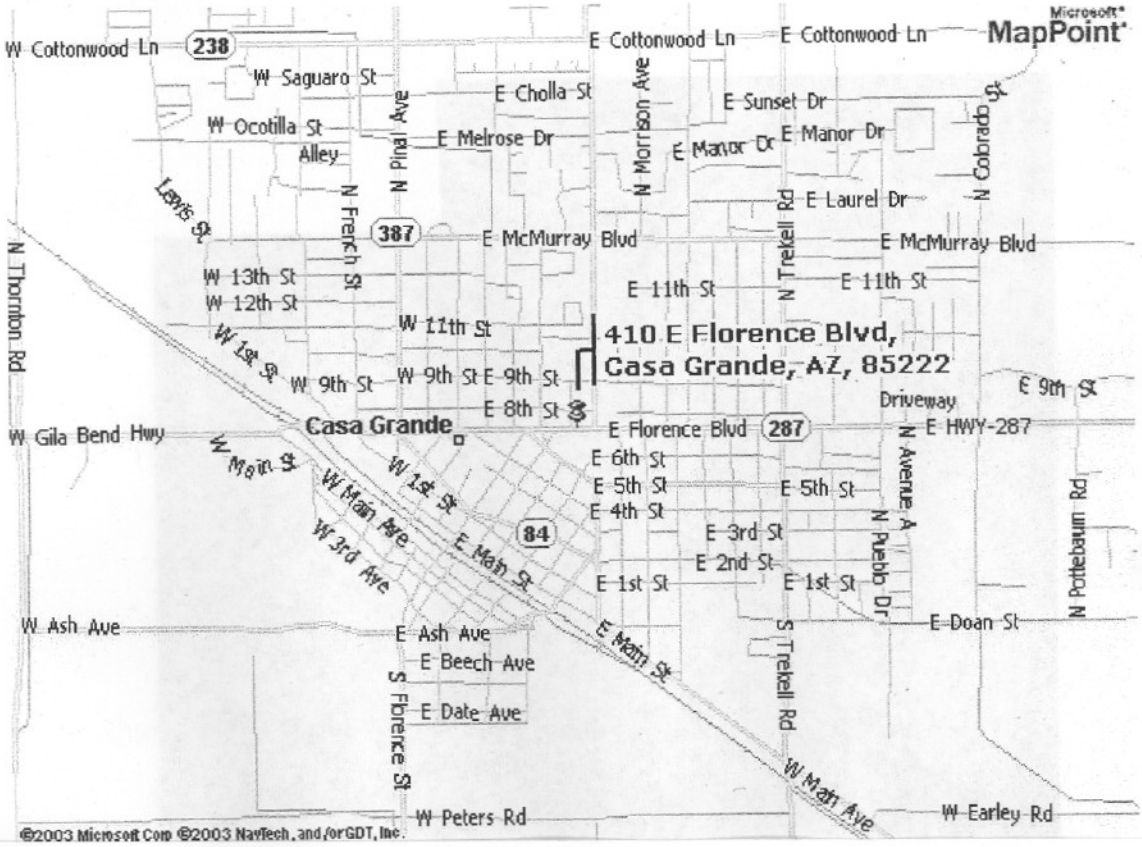
1. **Introductions, Approval of Previous Meeting Minutes, and Update on Action Items**
2. **Aspen to CAPE Conversion – Ron Onate, APS**
   - Cases Used
   - Comparison of Fault Currents
   - Problems Found
   - Solutions to Problems Found
   - Recommended Changes for Electrocon
3. **CAPE to Aspen Conversion – Ted Stanton, SRP**
   - Cases Used
   - Comparison of Fault Currents
   - Problems Found
   - Solutions to Problems Found
   - Recommended Changes for Aspen
4. **PTI to Aspen Conversion – Tom Field, WAPA**
   - Cases Used
   - Comparison of Fault Currents
   - Problems Found
   - Solutions to Problems Found
   - Recommended Changes for PTI

5. **Areas and Zones in Cases**
6. **Bus numbers in Cases**
7. **Equivalents Update**
8. **WestConnect/SWAT Maps Update**
9. **Determine Location of Next Meeting**

Meeting Location Instructions:

Lunch will be brought in at noon and the meeting will resume at 12:30.

Print this page using the print function in your browser.



Directions to Santa Cruz Water and Power Office
410 E. Florence Boulevard, Suite 2
Casa Grande, AZ 85222 520-876-4982

From Phoenix: On I-10 take Exit 185, Highway 387 into Casa Grande. Continue into Casa Grande approximate 8 to 9 miles to the intersection of Florence Boulevard (Highway 287) at the Holiday Inn. Turn left (E\east) and drive approximately 1 mile. Turn left (north) into the parking lot at Fidelity Title building. The Santa Cruz office faces Florence Boulevard and is the last office in the building. The Whataburger is directly across the street from the office.

From Phoenix: On I-10 take the Casa Grande Exit, Highway 287. Continue into Casa Grande approximately 4 miles. You will see the City Hall building on the right. Just past the City Hall complex on Florence Boulevard is a parking area at Fidelity Title. Turn right (east) in to the parking area and drive to the end of the white building (east). Santa Cruz is the last office and faces Florence Boulevard.

SWAT SC Working Group

May 18, 2006
9:30AM to 4:00PM
Location: Santa Cruz Water and Power Office
Conference Room
410 E. Florence Boulevard, Suite 2
Casa Grande, AZ

Name	Company	Phone	Email
Ron Oñate	APS	602 371 7754	ronald.onate@aps.com
Paul Dux	WAPA	602-605-2784	PDux@WAPA.GOV
Mark Etherton	SCWPDA	602-809-0707	mle@KRSALINE.com
MARIA RAMIREZ	SRP		
Ted Stanton	SRP		
Thomas Field	WAPA	602-605-2517	field@wapa.gov

Purpose of Short Circuit Database Group

April 13, 2006

The Short Circuit Database Group (SCDG) reports to the Colorado Coordinated Planning Group (CCPG) and is responsible for developing and maintaining up-to-date short circuit cases of the transmission system in the CCPG Area.

The CCPG Area is generally defined as the system consisting of transmission facilities belonging to the CCPG Participants.

This effort shall include but not be limited to the following tasks:

1) Define the system or systems within the CCPG Area to be represented and maintained.

2) Determine the preferred representation, either one complete CCPG Area case or multiple regional cases within the CCPG Area.

3) Develop a coordinated process for the periodic review and update of cases.

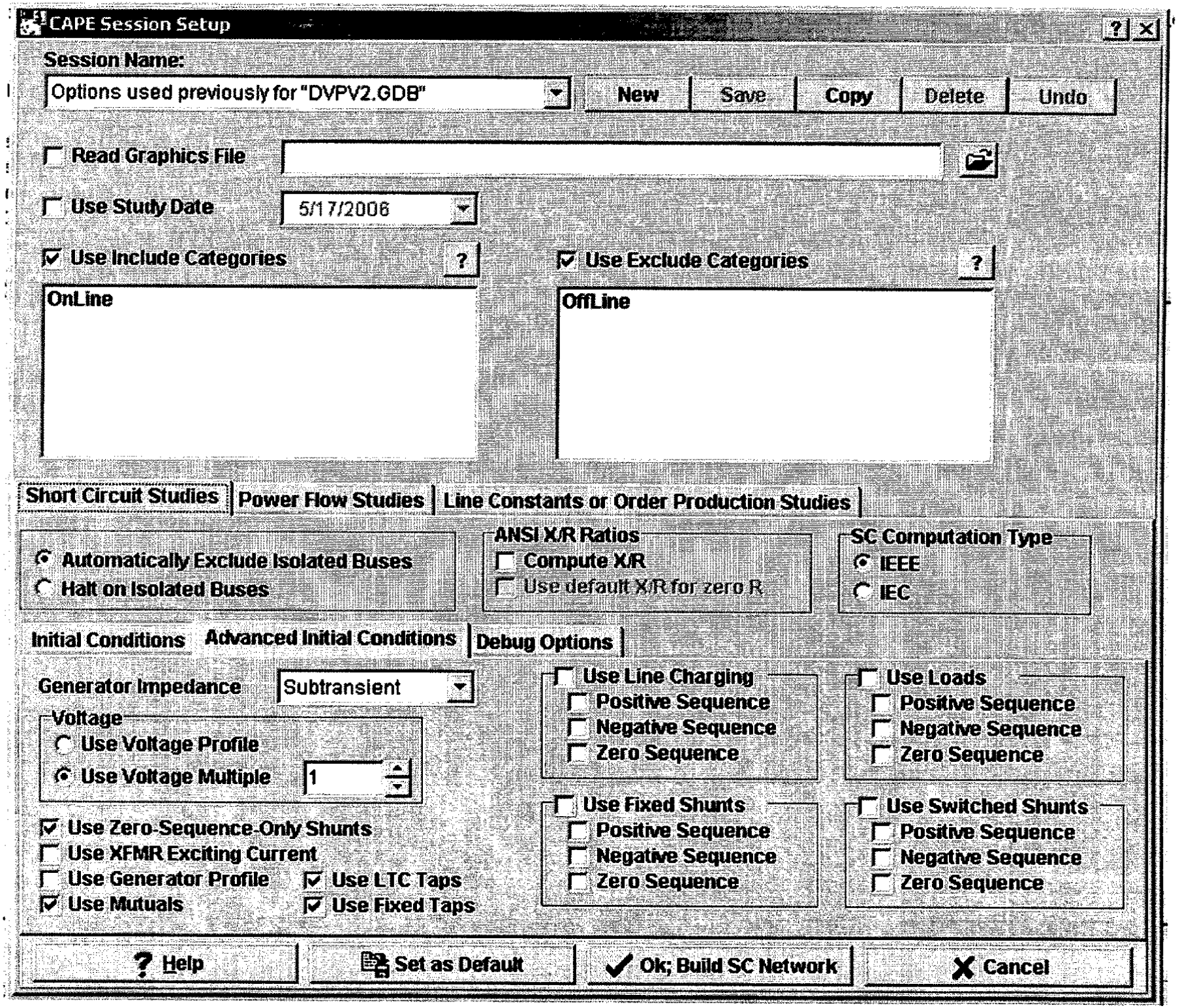
4) Ensure that cases are compatible with both the ASPEN and CAPE programs and compare short circuit results between the two programs.

5) Develop a plan for the periodic validation of short circuit program results with fault current data obtained from system disturbances.

6) Submit a brief status report at CCPG meetings either in person or in writing to the CCPG chairperson.

SCDG Participants

Name	Company	Telephone	Program
Mark Trevithick	Aquila	719-546-6481	PSLF/CAPE/fut. ASPEN?
Barry Francis Derik Johnson	Basin Electric	701-355-5642	ASPEN/PTI
Jeff Kukla	Black Hills	605-721-2279	ASPEN
Steve Schaarschmidt Chuck Sisk	Colorado Springs	719-668-4055 719-668-8025	ASPEN
Sikhiu Huynh	PacifiCorp	503-813-6896	ASPEN
Tom Barnish (chair) John Collins	Platte River	970-229-5258 970-229-5272	ASPEN
David Bleakely Ed Mayer	Public Service	303-571-7650	ASPEN/CAPE
Bill Middaugh	Tri-State	303-254-3433	ASPEN
Nick Klemm Pat Kautzman	Western	970-461-7205 970-461-7452	ASPEN
Bill Middaugh as liason Bill Middaugh as liason	PNM PNM		ASPEN ASPEN


CAPE Session Setup
Session Name:
Options used previously for "DVPV2.GDB"
New
Save
Copy
Delete
Undo
Read Graphics File
Use Study Date
5/17/2006
Use Include Categories
?
OnLine
Use Exclude Categories
?
OffLine
Short Circuit Studies
Power Flow Studies
Line Constants or Order Production Studies
Automatically Exclude Isolated Buses
Halt on Isolated Buses
ANSI X/R Ratios
Compute X/R
Use default X/R for zero R
SC Computation Type
IEEE
IEC
Initial Conditions
Advanced Initial Conditions
Debug Options
Generator Impedance
Subtransient
Voltage
Use Voltage Profile
Use Voltage Multiple
1
Use Zero-Sequence-Only Shunts
Use XFMR Exciting Current
Use Generator Profile
Use Mutuals
Use LTC Taps
Use Fixed Taps
Use Line Charging
Positive Sequence
Negative Sequence
Zero Sequence
Use Loads
Positive Sequence
Negative Sequence
Zero Sequence
Use Fixed Shunts
Positive Sequence
Negative Sequence
Zero Sequence
Use Switched Shunts
Positive Sequence
Negative Sequence
Zero Sequence
Help
Set as Default
Ok; Build SC Network
Cancel