SWAT SC Working Group Meeting
Thursday, October 26, 2006

Location: Nevada Power Company, Riverside Meeting Room

Time: 9:45AM-2:30 PM

Notes: Tom Field, 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 there had not been much work on some items since the last meeting. Tom stated that the majority of this meeting would be on the action items, the IEEE Switchgear meeting summary, and a new item on the plan for the work needed to get the cases ready to combine. Tom stated that since the holidays are coming up and there is enough work to be done by everyone, he would like to discuss the possibility of having the next meeting in January. The agenda was distributed and is attached to the end of these minutes.

There were 6 participants at the meeting and 4 participants on the teleconference. The list of members on the website was shown and the sign in sheet was passed around. Tom F. asked everyone if they would object to placing their contact information on the sign in sheet on the website in the meeting minutes. There were no objections. Everyone was asked to introduce themselves. The list of participants is attached to the end of these minutes.

The link to the previous meeting minutes on the website was shown next. The previous meeting minutes were distributed. Tom asked everyone to review the meeting minutes. Tom F. asked if anyone saw anything in the previous meeting minutes that they wanted changed or if there was anything they wanted added. There were no changes requested. Tom asked everyone if they agreed that the previous meeting minutes should be listed as approved. Everyone agreed. As an action item, Tom F. stated that he would show the September 2006 minutes on the website as approved. Tom asked if anyone say anything in the August meeting minutes that should be changed or added. There were no changes requested. Tom stated that the August meeting minutes were shown on the website as approved.

a) Action Items

The action items from the previous meeting were covered next.

The first action item was for Tom Field to place the August meeting minutes on the website as approved. Tom stated this had been done.

The next action item was for Steve Conrad to send a drawing of the symbol for the converter stations to Tom F. for placement in the July meeting minutes. Tom stated this was still an open action item.

The next action item was for Steve Conrad to report on the status of the CCPG short circuit case and the activities of the CCPG short circuit group. Tom stated that Steve forwarded an email from the Bill Middaugh with the CCPG group on the activities of the group. Tom showed this email. Tom read through the email and stated that because CCPG did not go through the process we were going through, they may have done some things which will cause more work for the group when we combine cases. Tom stated that he did not know how close they were on the fault levels between Cape and Aspen. Tom stated that Electrocon was making corrections to the problems the group was finding, but if these items are in the CCPG case and Excel makes fixes to the problems in their "work through the conversion to CAPE", we may have a problem with the conversion. Tom stated that he did not know whether they were setting up the information in zones for each member. Tom stated that he did not know if they were using WECC bus numbers, but if they weren't we would have problems with duplicate bus numbers. Tom stated that he did not know what the issues for mutual groups that were referred to were. Tom stated that they had compared to some faults, but did not know if they adjusted transformer tap settings and checked all of the generation that was on and off when these comparisons were made. Tom stated that he did not know how close they were on the measured fault levels and if they were bolted faults.

The next action item was for Tom Field to investigate the latest change made by Aspen which is supposed to take care of the transformer problems in the PTI to Aspen conversion. Tom stated that he had not had time to do this due to a week at the IEEE Switchgear meeting, a week of vacation, writing up the last meeting minutes, making the presentation for this meeting, taking care of other action items, and performing other work for WAPA. This is still an open action item.

The next action item was for Tom Field to rerun the DPV2 case and check to verify that the charging was not set to zero originally since the screen shot showed the "set charging to zero" as checked for the new Aspen transformer option comparison of PTI to Aspen. Tom stated that he had not had time to do this since the last meeting. This is still an open action item.

The next action item was for Tom Field to setup a links section on the webpage and place the IEEE PSRC, IEEE Switchgear, and WECC RWG links on it. Tom stated this had been done and showed where the link was. Tom stated that the group may want to add additional links and said this would be discussed during new items.

The next action item was for Tom Field to send Jorge B. the notes from the August 23 teleconference with SCE, SDGE, IID, and SWAT. Tom stated this had been done.

The next action item was for Jorge Barrientos to let Tom F. know if there were any problems with sharing the CFE short circuit data with SDG&E and SCE. Tom stated this had been done and showed the email Jorge sent on October 23. Tom showed the response to this email and stated that it did not specifically address sharing the data with SCE and SDG&E. Tom showed his response on October 24 to Jorge. Tom stated that because the group had a lot of work, he wanted this to be a Southern California effort. Robert S. stated that Jorge had sent Tom another email on October 26. Robert said that Jorge had talked to San Diego and San Diego is willing to combine the cases. Robert stated that Jorge didn't get to talk to SCE, but SCE was willing to combine the cases. As an action item, Tom Field will arrange a teleconference with the interested parties the week after the SWAT SCWG meeting.

The next action item was for Alex Fratkin to look into having NEVP/SPPC setup a webpage for the EN-SCSG. Tom stated that he had been contacted by the NEVP/SPPC IT department about his, so he assumed that Alex had done this. Tom stated that the IT department wanted to know how he had setup the webpage on OASIS. Tom stated that he informed the IT department that the only reason the webpage for the SWAT SCWG was setup on the WAPA OASIS webpage was because federal regulations on webpage formats would not allow the SWAT SCWG webpage to use the same format as the SWAT webpages. Tom stated that the OASIS website was used because it did not have to meet the federal webpage format requirements. Tom stated that the NEVP/SPPC IT department stated that it would be easier for them to setup the webpage on their regular servers. Tom stated that he informed the NEVP/SPPC IT department that he agreed that their own servers would probably be a better way to do this. Tom stated that he had not heard anything further from the NEVP/SPPC IT department or Alex F. on the webpage.

The next action item was for Tom Field to send out an email asking each member if they want to be on the EN-SCSG task force and if they would like to chair the task force. Tom stated this had been done and would be discussed in more detail during the agenda item on the task force.

The next action item was for Tom Field to export the .wmf file for the impedance map from the IID case and place it on the website in encrypted format. Tom stated this had been done. The map list on the website was shown. Tom pointed out that the SWRTA maps were shown as "under development" and that they should be on by the next meeting. Don A. stated that they would. Tom stated that the SWRTA cases and maps would actually be for each individual transmission dependent utility that is a member of SWRTA and when more cases are added, they would be labeled according to each utility name and zipped in the SWRTA file. Don A. agreed. Tom asked Don about the other utilities and Don stated that he was working on the next one.

The next action item was for Tom Field to send out the agenda for the next meeting with the directions and information provided by NPC/SPPC. Tom stated this had been done.

The next action item was for Tom Field to send the SWTC reclosing questionnaire to the members, compile the responses, and post them in an encrypted file on the website. Tom stated that this was still an open action item because he had not received responses from all of the members yet. Tom stated that he had one additional response posted on the website since the last meeting. Tom Spence stated that he couldn't open the zip file. As an action item, Tom F. stated that he would send Tom S. the encryption information after the meeting. Tom S. stated that he was starting a working group on reclosing that was composed of the member coops. Tom S. stated that this was due to recent failed transformers and other things. Tom S. stated that he would be having the first meeting the following week. Tom S. stated there were 6 or 7 coops in Arizona that would be on the working group. Tom S. stated that the working group would be developing standards for reclosing after reviewing the recloser survey responses and responses of others. Tom F. asked Tom S. if he would mind sharing the working group information with the SCWG. Tom S. stated that it should not be a problem. Tom F. stated that he would encrypt the information and place it in the file with the reclosing survey responses. Tom S. stated that this would be acceptable. This is still an open action item.

The next action item was for the entire group to send in their current cases in .dxt format to have conversion/error checked. Tom stated that all of the members except PNM had sent in their cases. This is still an open action item.

The next action item was for Maria Ramirez to contact Steve C. and ask him to send in the PNM case. Maria stated that she had contacted Steve by email and requested him to send in the PNM case, but did not receive a response. As an action item, Maria will call Steve C. and ask him to send in the PNM case for error checking. This is still an open action item.

The next action item was for the entire group to send in the areas and zones they want to use for their data. Tom stated that he still only had one utility with all of their dedicated zones. This is still an open action item.

The next action item was for the entire group to send in the zones they want to use for their mutual zone, their equivalent zone, and their seams zone. Tom stated this was still an open action item and that he would combine the zone action items.

The next action item was for the entire group to start putting area and zone information in their cases in preparation for the combining of the cases. Tom stated that this was still an open action item.

The next action item was for the entire group to send their information to Tom F. to change the buses spreadsheet if they are an owner of a seams bus and want different information than in the WECC case. Maria R. stated that she had sent the SRP information on October 25. Maria R. stated that SRP had requested additional zones from WECC that they were waiting on before determining which zones will be dedicated to seams buses. Maria R. stated that SRP had changed the bus names and zones in Aspen for seams buses. Tom stated this was still an open action item.

The next action item was for the entire group to review their seams buses that they are the owners of in the WECC case and return any split WECC buses to Tom F. and indicate which lines are connected to them and the bus numbers they want to use for them. Tom stated that most cases probably don't have split buses because most members have not been running breaker duty studies, so most of these for now will probably be from APS. Tom stated this is still an open action item.

The next action item was for Tom Field to change the buses spreadsheet to include any split bus information that members send in. Tom stated that he had not received any information yet, so this is still an open action item.

The next action item was for the entire group to identify their seams buses and send a revised list from the spreadsheet with just seams buses and indicate the names and numbers they want changed in the spreadsheet. Maria stated this was the information she sent on October 25. Tom stated this is still an open action item.

The next action item was for the entire group to change the names and numbers of their seams buses to match the spreadsheet names and numbers for the owners of the seams buses. Tom stated that this is a sequential task that is dependent on other tasks to be accomplished first. Tom stated that everyone needs to send in their seams bus information before others can change their cases for these. Tom stated this is still an open action item.

The next action item was for Tom Field to change the buses spreadsheet to include any changes that the members send in. Tom stated that he will update this with the information that Maria sent, but others have not sent their information in yet. Tom stated this is still an open action item.

The next action item was for Tom Field to put a branches sheet for all of the buses in the buses spreadsheet. Tom F. stated that he had not had time to do this since the last meeting, but stated it would be done before the next meeting. This is still an open action item.

The next action item was for Tom Field to show Alex F. the buses spreadsheet after the meeting and the methodology used for bus numbers. Tom stated this had not been done because Kevin put the numbers in without the need for this help.

The next action item was for Alex Fratkin to get Kevin S. to add bus numbers to the NPC case. Tom stated this had been done and that he had received the revised case from Kevin S.

The next action item was for the entire group to add unique bus numbers to their buses that have a bus number of 0 and send in their case for the second round of error checking to be able to determine the number of buses with a difference of 100 A or more. Tom stated that he had received a couple of revised cases, but not all of them. Tom stated this is still an open action item.

The next action item was for Tom Field to generate a list of the types of errors to be fixed and send to everyone before they send their fixed cases back. Tom stated that this was a sequential task that was dependent on other action items being accomplished first. Tom stated that he was still waiting on responses form Electrocon before he could determine all of the problem types.

The next action item was for David Gutierrez to fix the problems in the EPE case identified and send the fixed case back to Tom F. Tom stated that David had done this.

The next action item was for the entire group to make a list of the errors not in their data and identify whose data the error is in. Tom stated that this is a sequential task that was dependent on other action items being accomplished first. Tom stated that the list of problems needed to be finished before this task could be accomplished. This is still an open action item.

The next action item was for SRP to fix the problems in the SRP case identified and send the fixed case back to Tom F. for a second round of error checking. Maria stated that she was waiting on the list of characters that was acceptable before finishing this. This is still an open action item.

The next action item was for SRP to verify that the winding voltages on the 63 transformers identified with different winding voltages from base in Cape are correct. David W. stated that they had made changes to between 20 and 30 transformer taps. David stated that the majority of the transformers were correct. David stated that these came from their latest data in their transformer database for the current tap settings. Tom stated that the taps really depend on whether you are looking at the summer or winter because taps changes based on the season. Tom stated that we won't address summer and winter cases for now, but will bring this up again after we have finished our first case and are ready for the next year case.

The next action item was for Ron Onate to fix the problems identified in the APS case and send the fixed case back to Tom F. for a second round of error checking. Ron stated that he had not had time to do this yet. This is still an open action item.

The next action item was for Ron Onate to fix the bus names and kVs that are duplicates in the APS Cape case. Ron stated that he had not had time to do this yet. This is still an open action item.

The next action item was for WAPA to fix the problems in the WAPA case identified and send the fixed case back to Tom F. for a second round of error checking. Tom stated that he had not had time to do this yet. This is still an open action item.

The next action item was for Tom Field to contact TEP and ask them to correct the generator and transformer problems and send the case back. Tom stated that this had been done.

The next action item was for Ron Onate and Tom Field to perform a second round of error checking on the TEP case and generate the comparison spreadsheet. Tom stated that this had not been done, but he was scheduled to meet with Ron O. the following week to go through the second round of error checking. Tom stated that TEP sent some information on the data when they returned the case. Tom showed the information sent by TEP which did not appear to be a problem in the transformer. Tom stated that TEP showed that the generator problem was not one in their area. As an action item, Tom stated that he would send the correct data to TEP. Tom stated that since the information was not in the TEP area, this was not a problem because it would be replaced in the combined case with the correct data. This is still an open action item.

The next action item was for Ron Onate and Tom Field to check the IID case and put it on the website. Tom stated this would be done the following week when he meets with Ron. This is still an open action item.

The next action item was for Ron Onate and Tom Field to have a teleconference with Aspen and Electrocon to try and get them to form an agreement to share information needed for data conversion between the two programs. Tom stated this would be done the following week when he meets with Ron. This is still an open action item.

The next action item was for Ron Onate and Tom Field to rerun the cases after Electrocon fixes the DD transformer conversion problem. An email response from Electrocon dated October 6 was shown in which Electrocon stated that they would have the solution to this problem finished in a new release of the software the following week. Ron stated that he had problems updating the program from the internet version of the new release. Ron stated that Electrocon could not reproduce this problem because they did not have the same operating system and IT software. Ron stated that he is waiting for the new CD from Electrocon. Ron stated that he would ask for the CD before the meeting with Tom the following week. This is still an open action item.

The next action item was for Ron Onate to develop a list of what characters are not accepted in Cape. Ron stated that he would contact Electrocon the following week to ask again for this information. Ron stated he would send the information to Tom F. As an action item, Tom F. stated that he would send this information to the group. This is still an open action item.

The next action item was for Ron Onate to talk to Electrocon about changing the Cape program to accept other characters in the member's names and report on it. Ron stated that the Electrocon response to this request was that they would not alter Cape to accept other characters in the names.

The next action item was for Ron Onate to ask for the characters in the next response and add this to the teleconference discussion. Ron stated this would be done the following week. This is still an open action item.

The next action item was for Ron Onate and Tom Field to look into the "secondary voltage difference more than 20" problem in the NPC case and determine what the message means and what the problem is. Tom stated that some of these were fixed in the latest case. The transformers were changed from 500 kV to 525 kV. Ron and Tom will look at this the following week to determine if it is still a problem. This is still an open action item.

The next action item was for Ron Onate to look further into why 1 of the switches was not added in the APS log file and contact Electrocon if the report is incorrect. Ron stated that this would be done the following week. Ron stated that he would verify that the log report was incorrect. This is still an open action item.

The next action item was for Ron Onate to ask Electrocon why the "winding voltage different from base kV" message is generated for a 5% difference. An email response on this issue from Electrocon on October 6 was shown for the Westwing transformer in the EPE case. The response stated that the voltages for the winding and tap of the secondary and tertiary were reversed. This was shown in the Aspen transformer model. More of the Electrocon response on the EPE case was shown for the Cox transformer in the EPE case. The report stated that there was a YD transformer in parallel with a YY transformer. The Aspen representation was shown to verify this and one of the transformers was shown out of service. The configuration of each transformer was shown where one was an autotransformer and the other was a YD transformer. As an action item, David G. stated that he would look at this and remove one of them if it is not there.

The next action item was for Ron Onate to look at the 19 transformers with duplicate ckt, 19 neutral buses added, and 19 bus ties added in the SRP case to determine if they were the same. Ron stated this would be done the following week. This is still an open action item.

The next action item was for Ron Onate and Tom Field to look into the cause of the "end buses were not found on bus ties" warning message in the TEP case. Ron stated this would be done the following week. This is still an open action item.

The next action item was for Ron Onate and Tom Field to look into the cause of the "mutual couplings ignored because bus not found" warning message in the TEP case. Ron stated this would be done the following week. This is still an open action item.

The next action item was for Ron Onate and Tom Field to look at what changed during the conversion process for the APS case to give the differences between the pre and post cases. Ron stated this would be done the following week. This is still an open action item.

The next action item was for Ron Onate and Tom Field to rerun the SRP faults after the meeting and look at the differences if they are the same to find out why there were differences between Aspen and Cape. Ron stated this would be done the following week. This is still an open action item.

The next action item was for Ron Onate and Tom Field to look at the differences in the Cape and post results for the WAPA case to find out what the differences are due to. Ron stated this would be done the following week. This is still an open action item.

The last action item was for Ron Onate to discuss a plan for the equivalents checking work with Steve after the meeting. As an action item, Ron stated that he would call Steve the following week to setup a timeline and teleconference for developing the plan. This is still an open action item.

Tom asked if there were any additional action items that were not in the draft of the meeting minutes. There were no responses.

This concluded the update of all action items in the list from the September meeting minutes. Tom stated that there were some other things that had occurred since the previous meeting and that he would give an update on these items.

b) New Items

Tom stated there was an Aspen User Group meeting at the Western Protective Relay Conference on October 16. Tom asked if anyone attended. Maria R. stated that someone from SRP attended. As an action item, Maria stated that she would find out who attended and ask them if they would give a report to the group on the meeting. As an action item, Mike A. stated that he would ask Lane C. of WAPA if he went and if he did, he would ask him if he would provide a report to the group.

The link for the Western Protective Relay Conference was shown. Tom asked if anyone attended this. There were a few responses that it had been attended by various members in the past, but not this year. Tom asked if the group should put a link to this conference on protection in the West on the website. Everyone agreed that this link should be put on the website. As an action item, Tom F. will place a link to the Western Protective Relay Conference on the website.

Tom stated that Mike A. would give a report on the IEEE PSRC meeting, but he had not heard anything from Steve C. yet. Mike A. stated that he did not attend the meeting this time. Mike stated that he wanted to talk a little about the end-to-end transient testing that WAPA was doing. Mike stated that WAPA had found a problem with testing some differential relays with just a stepped response and they had started a transient testing program using EMTP files to generate the comtrade waveshapes for the testing.

Tom stated that an update had been given to Ron Moulton of WAPA to give to SWAT for the October 18 SWAT meeting. Tom stated that he did not know what was said, but showed the list of items given to Ron M. for the update on the SWAT SCWG. Tom stated that while the next meeting was discussed, he had told Ron M. that this would have to be decided by the group. Tom stated that he would like to have the group start on the work of combining the cases by January. Tom stated that there was work that would have to be done in the first combination to setup guidelines for everyone to use and that he would like to start on this in January. Tom stated that after the SWAT meeting, Ron M. had told him that one of the SWAT members asked when the group would be finished with the first Case. Tom stated that Ron's response was mid 2007 based on the map proposal date.

The meeting was adjourned at this point for lunch from 12:00 pm to 12:30 pm.

Tom stated that the next new item was a report from the Fall 2006 IEEE Switchgear Committee meeting. Tom stated that he attended the High Voltage Circuit Breaker Subcommittee meetings and that Brad Staley of SRP attended the High Voltage Circuit Breaker Subcommittee meetings from October 2 through October 5 in Milwaukee, Wisconsin.

Tom stated that he was not aware of any other SWAT members attending any of the other subcommittee meetings. Tom stated that the other subcommittees were High Voltage Switches, High Voltage Fuses, Low Voltage Switchgear Devices, Relcosers and Other Distribution Equipment, and Switchgear Assemblies. Tom stated that there were many issues related to lowering of the high voltage circuit breaker capabilities in the 1999 version of the standards. Tom stated that he had been trying to get these capabilities back for the past several years, so he had been attending the high voltage circuit breaker subcommittee meetings. Tom stated that there were also changes to the low voltage circuit breaker standards that had been discussed, but these were not an issue for WAPA. Tom stated that some of the members with distribution systems may want to consider sending someone to the low voltage circuit breaker subcommittee meetings. Tom stated that there were also some issues with TRV in the switch standards. Tom stated that he had brought this up at some early meetings of the group combining the switch standards and discussed some problems with the 1247 standard. Tom stated that he is not following the switch standards very closely, but someone from the group with a distribution system may want to consider participating in this subcommittee.

Tom stated that he attended meetings for the Corrigenda on C37.04 and C37.09, the C37.06 revision, the CIGRE TRV working group A3-19, the new HVCB specification Guide C37.12, the new Instruction Book Guide C37.12.1, the Transformer and Circuit Breaker Interaction task force C57.142, and other meetings not directly under the High Voltage Subcommittee subgroups.

Tom stated that the Corrigenda for C37.04 and C37.09 was working on fixing problem in C37.04 and C37.09 from 1999 related to the IEC waveshape. Tom stated that the C37.04 Corrigenda was balloted prior to the meeting and that he had submitted 89 comments with a negative ballot which were more than any other utility submitted. Tom stated that his comments were addressed in the meeting and most were accepted. Tom stated that C37.09 was balloted the week after the meeting and that he submitted 13 comments.

Tom stated that several of his comments on the C37.04 Corrigenda were related to the three phase ungrounded faults not being sufficiently covered. Tom stated that the current standards violate the NESC because there is no option to cover 3 phase ungrounded faults at 230 kV and above. Tom stated that he provided an OSHA letter that stated this and that the working group agreed to change the wording in the Corrigenda. The OSHA letter was distributed and is attached to the end of the minutes.

Tom stated that some of his comments were related to the short line fault reduction not being justified. Tom stated that he stated that the previous justification for the reduction showed that the value of 1.6, which is a 12.5% reduction of this capability, was not sufficient for 69 kV using a linear interpolation of the German line data that the lower IEC value was based on. Tom stated that he stated that the CIGRE WG A3-19 had finished their investigation of the SLF and reported at the Spring 2006 meeting held in conjunction with the IEEE Switchgear meeting that they found there were 3 conditions where a d factor of 1.6 was not sufficient. Tom stated that he had stated that these three conditions were when there was low soil resistivity and that he pointed out that when it rains, the soil resistivity is reduced. Tom stated that he had stated that the second condition is when lower voltage lines are put on higher voltage structures and he pointed out that many utilities do this. Tom stated that he had stated that the third condition is when there is no overhead shield wire and he pointed out that many utilities do this for subtransmission. Tom stated that he asked the chairman of the CIGRE group in the room, Roy Alexander, if his statements about the findings of the CIGRE group were correct and that Roy had responded that they were. Tom stated that he would continue to try to get the SLF reduction returned, but there was an even stronger finding of the CIGRE group which would recommend increasing the value beyond what it was previously to cover three phase line faults.

Tom stated that he had submitted 13 comments on the Corrigenda for C37.09, but the scope of the Corrigenda would not allow him to comment on other issues in the document. Tom stated that the 16 test duties in the previous standard were reduced to 10 test duties and that the test duties themselves were changed. Tom stated that he would work on getting the problems with the test duties resolved during the next revision of the standard. Tom stated that he had discussed the problems with the changes with some of the other utilities after the standards had been changed and that they thought it would be best to argue the significant problems sequentially. Tom stated that the first problem was to get the reduction in the 3 phase fault TRV, a 15% reduction that violated the NESC, returned, the second problem was getting the reduction in the SLF returned, and the last problem was to get the test duty requirements returned. Tom stated that the utilities had managed to get the 3 phase fault TRV put into the Corrigenda as an option and had more support now for not only returning the SLF capability, but getting a higher value than previously put in. Tom stated that this was also the reason he initially formed the Utility Get Together because many utilities were not aware of these issues and did not have a forum like NEMA to discuss common problems with the standards from a utility perspective. Tom stated that he would start concentrating on the test duties next. Tom stated there was a problem raised during the Utility Get Together at the Fall 2006 meeting by a utility on the change in the test duties.

Tom stated that the latest C37.06 revision was for putting in the levels for the TRV revisions based on the change from the 1-cosine and exponential waveshape of the previous IEEE standards to the IEC 2 and 4 parameter references. Tom stated that draft 7.8b was discussed at the meeting and there was a lot of controversy over the capacitor switching levels to use. Tom stated that they would be sending out a new ballot invitation.

Tom stated that the CIGRE WG A3-19 had finished their work and was now working on publishing a CIGRE paper on their results. Tom stated that the results showed that a 3 phase line fault TRV is not covered by the standards for some source values at some distances. Tom stated that the group had stated that they would recommend that the short line fault d factor be raised to 2.4 to cover these faults. Tom stated that they found that the amplitude was higher, but the rate of rise was slower for these faults.

Tom stated that the C37.12 working group addressed some of the ballot comments in draft 6 and would email out the other comments not addressed at the meeting to be addressed between meetings. Tom stated that the group hoped to resolve the comments by the Spring 2007 meeting. Tom stated that most of the comments were from manufacturers.

Tom stated that the C37.12.1 working group discussed comments from the members on draft 2 and that most of the comments were from manufacturers. Tom stated that the main issue was whether the guide should cover breakers from 1 kV and up or the requirements for the lower voltage breakers.

Tom stated that there was a teleconference held between the transformer committee and the switchgear committee on C57.142. Tom stated that the teleconference was setup due to comments on the ballot from the switchgear members. Tom stated that in the teleconference, the switchgear committee pointed out that the writeup on current chopping was incorrect. Tom stated that the switchgear committee pointed out that the guide did not use the correct difference between restrike and reignition. Tom stated that the switchgear committee pointed out that the harmonics from electronic loads were responsible for exciting the resonance in the transformers in the references given and not multiple reignitions. Tom stated that the switchgear committee pointed out that the guide should give guidance on when to apply the guide and that there is an article in the Jan/Feb 2005 Electra publication which they should use. The transformer committee agreed to withdraw its par and apply for a new par for joint ownership of the standard between the transformer and switchgear committees. The switchgear committee pointed out that losses in the transformers need to be addressed in the guide.

Tom stated that the other meetings that he attended that were not groups under the high voltage circuit breaker subcommittee were C37.30.1 working group on harmonization of switch standards, the Utility Get Together, the HVCB subcommittee meeting, the main switchgear committee meeting, and an informal meeting on the X/R ratio paper.

Tom stated that the C37.30.1 working group was combining the switch standards C37.30, C37.32, C37.34, C37.36, C37.36b, and C37.37 into a single standard C37.30.1. Tom stated that this work has been going on for several years and that the group was now resolving comments. Tom stated that the group would resubmit the C37.30.1 document to the editorial board before voting. Tom stated that a new working group for type testing for wind loading would be formed to support C37.30.1 concerns.

Tom stated that at the Utility Get Together, SCE presented problems on an SF6 breaker failure. Tom stated that the presentations weren't on the website, but he would try to get them to start putting the presentations on the IEEE PES VC as had been done when he setup the group. Tom stated that he pointed out to SCE that the problem may be due to the arrester leads because SCE had stated that the arrester did not fire. Tom stated that SCE was going to send him pictures of the installation to see if it looked like this may have been a problem.

Tom stated that at the Utility Get Together, another utility pointed out a problem with the new (1999) test duty which used to be (1979 through 1997) O-CO with 15 seconds, but now has 3 minutes which is too long. Tom stated that another discussion by Ameren was on problems they were having with vertical break disconnect switches. Tom stated that the last presentation was by ConEd on the successful tests at Kema of the solid state current limiter.

Tom stated that at the High Voltage Circuit Breaker (HVCB) subcommittee meeting, it was stated that NEMA SG4 would be combined into C37.04 and C37.09. Tom stated that C37.013a and C37.013 was going out for ballot in mid October, but would not be on the my ballot system. Tom stated that if anyone was interested in balloting the document, they would have to send an email to the chairman to request being put in the ballot pool. Tom stated that this is the generator circuit breaker standard and that because WAPA does not own generation, he was not going to ballot the standard. Tom suggested that the members that do have generation should consider balloting the standard. Tom stated that he had worked with the group to get some changes put in when he worked for another utility that did have generation.

Tom stated that at the HVCB subcommittee meeting, it was stated that the subcommittee will start working on a guide for shunt reactors at the next meeting. Tom stated that C37.081 and C37.083, which are test standards used by the manufacturers for their design tests, were open for ballot. Tom stated that he had joined the ballot pool for these standards and would ballot them if he had time. Tom stated that it was stated that C57.21 for dielectric stress imposed on shunt reactors during switching would be worked on with the transformer committee and the switchgear committee. Tom stated that the chair of the switchgear committee told the transformer committee that the annex on TRV in C57.16 was outside of the C57 scope. Tom stated that the transformer committee wants to turn the annex into a joint working group paper between the switchgear and transformer committees.

Tom stated that at the main committee meeting, it was stated that C37.45 on enclosed air switches passed the ballot, C37.43 on capacitor fuses was out to ballot, the 1247 interrupter standard test section was recommended to be taken out, the C37.082 standard for sound pressure for breakers would become a dual logo standard with IEC because IEC doesn't have a standard covering this, and the standard 1036 which is the shunt capacitor application guide is out to vote. Tom stated that he had signed up for the ballot pool and would ballot this standard if he had time. Tom stated that the previous capacitor standard had lowered the margins by requiring that any voltage that you can operate at be specified as your voltage now instead of using the tolerance. Tom stated that he had previously asked for a formal interpretation on the capacitor standard due to work he had done while working for another utility related to problems from this reduction in capabilities. Tom stated that the members should look at how they are specifying capacitors to make sure they are using the top voltage in their operating range instead of the nominal voltage which they used to use for capacitors according to previous versions of the standard.

Tom stated that at the main committee meeting, it was stated that the standard C37.66 on capacitor switches was approved, the C37.74 standard on underground equipment formed a working group, and that NEC article 490 was causing changes in equipment.

Tom stated that he met with Mitsubishi and HVB to discuss the X/R ratio paper. Tom stated that he had not had any time to perform any work on the paper since the Fall 2005 meeting. Tom stated that he brought Mitsubishi into the paper to run ATP simulations because WAPA is currently "black listed" from using ATP. Tom stated that he had had discussions with their CSO group about using their membership in EPRI to have anything done in the DCG version of EMTP that they may need and canceling their membership in DCG so others at WAPA could use ATP (as well as have an EMTP program that could be used at home for standards and educational work since most people use ATP at home and most standards reference it for EMTP work done). Tom stated that the sections of the paper to be written were reviewed. Tom stated that everyone was in agreement that the paper needs to be written before the C37.010 revision begins so the changes can be put into the standard.

Tom asked if anyone had any other old or new items to discuss before going on to the next agenda item. There were no other items brought up for discussion.

2) PTI to Aspen Conversions

The meeting continued with the next agenda item on PTI to Aspen Conversions. Tom stated that he had not had time to perform any additional work on the PTI to Aspen conversions since the previous meeting.

This concluded the PTI to Aspen conversion agenda item.

3) Check of Members Cases

The Check of Members Cases agenda item was covered next. Tom and Ron stated that they had not had time to perform any additional work on the Check of Members Cases since the previous meeting.

Tom stated that the IID case was waiting to be checked. Tom stated that NPC had sent in a revised case for the 3rd round of error checking. Tom stated that EPE and TEP had sent in a revised case for the 2nd round of error checking. Tom stated that PNM was the only case that had not been submitted. Tom stated that Electrocon had not answered all of the questions on the errors yet. Tom stated that everyone should start making a list of errors not in their data when Electrocon responds to all of the error questions. Tom stated that the errors pointed out in the last meeting still need to be checked.

This concluded the Check of Members Cases agenda item.

4) WestConnect Map Work Proposal

The WestConnect Map Proposal agenda item was covered next. Tom stated that the response developed by the group at the last meeting to the questions that WestConnect had was sent to SWAT on September 29 to present at the next WestConnect meeting on October 25. The email responses were shown and read.

This concluded the WestConnect Map Work Proposal agenda item.

5) Areas and Zones in Cases

The Areas and Zones in Cases agenda item was covered next. Tom stated that he had only one response on the mutual, equivalent, and seams zones. Tom stated that he had no responses on the seams buses, bus number differences from WECC, and split bus information. Tom stated that everyone needs to send this information in before others can finish the preparation of their cases for the combining. Tom showed the areas and zones data in the spreadsheet.

This concluded the Areas and Zones in Cases agenda item.

6) Equivalents Update

The Equivalents agenda item was covered next. Tom asked Ron if there was any work done on the equivalents since the last meeting. Ron stated that he had not had time to do anything with the equivalents since the last meeting.

This concluded the Equivalents Update agenda item.

7) SWAT SCWG Task Force for East Nevada Short Circuit study

Tom stated that he had sent an email to the members on October 20 to solicit membership in the task force and request a volunteer to chair the task force. Tom stated that he had not received any responses to the solicitation. Tom stated that he would like to try to finalize the list. Tom stated that WAPA would be a member because they had a substation that would be affected. Tom asked Don A. if SWRTA wanted to be a member. Don stated that he discussed the issue with Dennis D. and they determined that they would not participate. Tom asked Robert S. if IID wanted to be a member. Robert stated that IID would not be able to attend the meetings. Tom asked Ron O. if APS wanted to be a member. Ron stated that he would talk to his supervisor the following week and let Tom know if APS wanted to be a member. Tom asked Maria R. if SRP wanted to be a member. Maria stated that SRP did not want to assign someone to participate. Tom asked Kevin S. of NPC if NPC/SPPC wanted to be a member. Kevin stated that he would be a member, but could not chair the task force due to his workload. Tom stated that PNM and EPE were far enough away that they would probably not be concerned about being a member. Tom stated that Unisource does have some stations which may be affected. As an action item, Tom F. stated that he would talk to TEP about TEP/Unisource being a member. Tom S. of SWTC did not state whether or not SWTC wanted to be a member.

Tom stated that he had only received one comment about chairing the task force and it was a recommendation that he chair it. Tom stated that he would prefer not to because of the work he had with chairing the working group. Ron O. suggested that Alex F. chair the task force since NPC/SPPC is a member of the working group. As an action item, Tom F. stated that he would contact Alex F. and ask him to chair the task force.

Tom stated that the date for the next EN-SCSG meeting was not known. As an action item, Kevin S. stated that he would contact Alex F. and obtain the date for the next meeting.

Tom stated that the EN-SCSG webpage location was not known. As an action item, Kevin S. stated that he would send the address of the webpage to Tom F. As an action item, Tom F. stated that he would put the link to the webpage on the SWAT SCWG webpage.

This concluded the SWAT SCWG Task Force for East Nevada Short Circuit study agenda item.

8) Case Combination Preparation

Tom stated that everyone should be preparing for the case combination. He stated that he added a new agenda item to address this and wanted to go over the plan so everyone understood the importance of their participation in getting it accomplished. Tom stated that the case combination preparation was composed of three sections and that he wanted to cover the tasks that everyone should be performing during each of these sections. He stated that the first section was the error checking and program changes, the second section was equivalents methods, and the third section was individual case development. Tom stated that the first two sections were sequential because APS was the only member with Cape and had to be involved in both sections. He stated that everyone had tasks to accomplish in the third section that would be performed during the sequential work of the first two sections and in a final stage before combining the cases.

Tom stated that they were currently working on the error checking and program changes section. Tom stated the work tasks in this section consisted of determining problems in the programs and the individual databases, obtaining transparent conversions between the SWAT member programs, and identifying needs for the individual case development.

Tom stated that when the error checking work was completed, the work in the equivalents section would be performed. Tom stated that the work tasks in this section consisted of determining how equivalents will be calculated to minimize error and identifying needs for the individual case development.

Tom stated that the individual case development section consisted of three sequential stages of work. He stated that the first stage consisted of work that could be accomplished by the each member while the Error Checking was being worked on. He stated that the second stage consisted of work that could be accomplished by each member while the Equivalents Methods was being worked on. He stated that the final stage consisted of the final work before combining cases.

Tom stated that the group was in stage 1 today which consisted of areas and zones work, bus numbers work, bus names work, and problem resolution work. Tom stated that for the areas and zones work, the tasks would be performed in three sequential steps. He stated that the first step was for each of the members to identify their zones range, seams zone, equivalents zone, and mutual zone for all of the other members to know. He stated that each member should also identify their split seams buses during this step. He stated that the second step was for each member to change the zones in their cases for their data to match zones given to the group during the first step. He stated that the third step was for each member to modify their seams zones to other member's seams zone numbers. He stated that each member should also make split seams buses that others have.

Tom stated that for the bus names work, the tasks would be performed in four sequential steps. He stated that the first step was for each member to identify their seams bus names and numbers. He stated that the second step was to modify the seams bus names and numbers in their cases that they are not the owners of to the seams bus names and numbers that others identified. He stated that the third step was for the error checking people to identify the bus names not acceptable in Cape. He stated that the fourth step was for each member to modify all of their bus names that have characters not acceptable by Cape to characters acceptable by Cape.

Tom stated that for the problem resolution work, the tasks would be performed in three sequential steps. He stated that the first step was for the people checking the cases to look at problems identified by Cape and Aspen in each case. He stated that the second step was for each member to fix the problems for their data identified as having problems. He stated that the third step was for the people checking the cases to generate a list of all the types of problems to be solved by the members.

Tom stated that the second stage of work would be performed during the equivalents methods section after the first stage was completed and consisted of three sequential steps of work. He stated that the first step was for each member to fix all of the remaining problems from the final list of errors generated by the last step of the first stage of work. He stated that the second step was for each member to identify where equivalents need to be generated. He stated that the third step was for each member to obtain updated data for their equivalents.

Tom stated that the third stage of work would be performed after the equivalents methods section was completed and consisted of two sequential steps. He stated that the first step was for each member to generate equivalents in their case using the methods determined in the Equivalent Methods section. He stated that the second step was for each member to perform a final check of their data including areas, zones, bus names, bus numbers, seams buses, problems, and equivalents.

Tom restated that most of the tasks identified are to be performed by each member and should be done in parallel with the work that Ron was performing on error checking and equivalents methods. He stated that everyone should be working on these tasks today and that each member has to participate in this work for the others to perform their work.

This concluded the Case Combination Preparation agenda item.

9) Determine Location of Next Meeting

The last agenda item, Determine Location of Next Meeting, was covered next. Tom stated that there had not been much work performed since the last meeting. He stated that the holidays in November and December would cause problems with attendance. He stated that some of the members have end of year projects that will cause problems with attendance. He stated that there is a lot of preparation work that each member can perform for combining the cases which does not require a meeting. Tom suggested that the group meet in January and start working on combining cases. He stated that the error checking should be near completion at that meeting and there should be an update on equivalents work performed.

Tom stated that the third Thursday in January is January 19. He stated that the third Tuesday in January is January 16. He stated that the third Thursday of each month conflicts with the Phoenix IEEE PES meetings. He stated that Steve C. expressed a desire to have the meetings on Tuesdays instead of Thursdays. Tom stated that given all of these issues, when would the group like to meet next? Everyone agreed to meet in January. Tom asked what date the group would like to meet on. Most said that Thursday works better for them than Tuesdays. Some stated that January 19th is too soon after the holidays and they would be catching up on work during that week. It was suggested that January 25 which is the fourth Thursday of January be the date of the next meeting. Tom asked if everyone agreed with this date. Everyone agreed to meet on January 25.

Tom F. asked if anyone wanted to volunteer to host the next meeting. Tom S. stated that the group had been having a rotating schedule, but had not met with SWTC yet. Tom S. stated that SWTC would like to host the next meeting at one of their member's locations in Tucson. Tom F. asked if everyone agreed to have the next meeting in Tucson. Everyone agreed. Tom F. asked what time the group wanted to have the next meeting. Tom F. stated that the group had been scheduling a time between 9:30 am and 4 pm, but had been finishing an hour early. He stated that there should be a lot of additional work to report on at the next meeting. He asked if the group wanted to schedule the same time to meet or a different time. Everyone agreed that the meeting should be between 9:30 am and 4 pm.

As an action item, Tom F. will send out the agenda for the next meeting with the directions and information provided by Tom S. Tom F. asked if there were any other items that anyone would like to bring up. There were no other items brought up. The meeting was adjourned at approximately 2:30 pm.

SWAT SC Working Group

October 26, 2006
9:30AM to 4:00 PM Pacific Time
Location: Nevada Power Company
Riverside Meeting Room
6226 W. Sahara Avenue
Las Vegas, NV 89151

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. **PTI to Aspen Conversion – Tom Field**
3. **Check of Member Cases – Ron Onate and Tom Field**
4. **WestConnect Map Work Proposal**
5. **Areas and Zones in Cases**
6. **Equivalents – Ron Onate and Steve Conrad**
7. **SWAT SCWG Task Force for East Nevada Short Circuit Study Group**
8. **Case Combination Preparation**
9. **Determine Location of Next Meeting**

Meeting Location Instructions:

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

Please see attached map for directions from airport.

Driving Directions from McCarran Airport to Nevada Power Company (see attached map)

⇒ Take Interstate 15 North to the Sahara Avenue exit (approx. 5-7 miles). Because I don't know the location of your rental car company, ask them to give you directions to I-15 north.

⇒ Turn left (West) onto Sahara Avenue and travel approximately 3.5 miles to just past the intersection of Sahara and Jones Blvd. Nevada Power Company is located at 6226 West Sahara Avenue on the North side of Sahara Avenue approximately 500 feet past Jones Blvd.

SWAT SC Working Group

October 26, 2006
9:30AM to 4:00PM
Location: Nevada Power Company
Riverside Meeting Room
6226 W. Sahara Avenue
Las Vegas, NV

Name	Company	Phone	Email
Tom Spence	SWTC	(520) 586-5144	TSpence@swtransco.coop
MARIA RAMIREZ	SRP	602-236-0217	mdramire@srpnet.com
David Wheeler	SRP	602-236-0987	Dewheele@SRPNet.com
Gary Kopps	NPC	702-657-4019	GKopps@NEVP.com
Kevin Salsbury	NPC	702-657-4022	KSalsbury@nevp.com
Thomas Field	WAPA	602-605-2517	field@wapa.gov
David Gutierrez (teleconference)	EPE	915-543-4083	dgutierr@epelectric.com
Don Adams (teleconference)	SWRTA	480-610-8741	dca@krsaline.com
Mike Agudo (teleconference)	WAPA	602-605-2610	agudo@wapa.gov
Robert Sanders (teleconference)	IID	760-482-3446	rlsanders@iid.com
Ron Onate (teleconference)	APS	602-371-7754	ronald.onate@aps.com

< **NOTE:** This document represents the opinion of the author. Any interpretation provided herein is informal in nature. It should not be construed as official OSHA policy. Official interpretations are the responsibility of the Office of General Industry Enforcement, which can be reached at 200 Constitution Ave., NW; Washington, DC 20210.

I have reviewed the IEEE paper "Analysis of Transient Recovery Voltage (TRV) Rating Concepts." I have some concerns about the assumptions the paper and the IEC standards make with regard to the existence of ungrounded systems and the probability of a three-phase ungrounded fault.

First, the paper and the IEC assume that all systems 245 kV and higher are grounded. The paper states:

> [The IEC assumes] that all systems of 245 kV and above will be effectively grounded...
>
> In the authors opinion, the IEC logic is sound. Certainly most if not all systems of 245 kV and above are effectively grounded.

I know of no ungrounded systems over 245 kV. However, the National Electrical Safety Code does not require these systems to be grounded. So it certainly is conceivable that there are one or two systems that are ungrounded. Additionally, an ungrounded 245 kV or higher system could be installed in the future. A circuit breaker with a first pole to clear factor of 1.3 would clearly be unsuitable for such a system since the breaker might not be able to clear a grounded or ungrounded three-phase fault.

Second, the paper and the IEC assume that the probability of a three-phase ungrounded fault is negligible. The table in H. H. Schroman's comment on the paper clearly shows that this is not the case. The percentage of ungrounded faults on systems 245 kV and higher is zero in only one case. In all the other cases, ungrounded faults make up from 4 to 13 in 1000 faults. This is hardly negligible. A probability of more than 1 in 1000 that a fault will be a three-phase, ungrounded one is substantial. It might be argued that the probability of a fault occurring is small in the first place, but this argument is not compelling. After all, circuit breakers are designed to interrupt faults, and the probability that a breaker will have to interrupt a fault sometime during its working lifetime is very high. In addition, even if the chance that a single circuit breaker will see a fault might be low, there are so many circuit breakers that the chance that one or more of them will experience a fault is also very high.

When employees will be working at more than one location in a line section, the OSHA standard for the construction of electric power transmission and distribution installations requires short circuiting all three phases and grounding them (§1926.954(f)). Although OSHA standards require connecting the ground end of a grounding jumper before connecting the jumper to the line or equipment (§§1910.269(n)(6) and 1926.954(e)(1)), the standards do not prohibit short circuiting the phases before installing the ground. Thus, short circuiting all three phases before connecting the ground is an acceptable way of meeting the OSHA requirements. If the circuit is energized during the time the phases are short circuited but before the ground connection has been installed, a three-phase ungrounded fault will occur while employees are working on the line. If the circuit breaker fails during this time and leaves the circuit energized, these employees would be at risk along with any employees working near the circuit breaker.

As you noted, Section 171 of the 2002 National Electrical Safety Code contains the following requirement: "Devices that are intended to interrupt fault current shall be capable of safely interrupting the maximum short circuit current they are intended to interrupt, and for the circumstances under which they are designed to operate." I read this provision as requiring a circuit breaker to be able to interrupt safely any fault on the system. Section 171 also requires the utility to review the interrupting capacity before each significant system change, so clearly interrupting devices have to be suitable for the design of the system. It is the system, after all, that determines what types of faults can occur and what the maximum short circuit current is. For example, if a three-phase grounded-wye system is designed so that the circuit breaker may have to interrupt a three-phase ungrounded fault, then a circuit breaker design with a first pole to clear factor of 1.3 would not meet the requirement.[1] Further, this circuit breaker would not be suitable for installation on an ungrounded three-phase system unless the system design precludes the possibility of a three-phase fault or can somehow otherwise safely interrupt such a fault without damage to the breaker.

OSHA does not enforce the NESC, however. We have our own standards for the protection of employees working on electric power transmission and distribution systems–§1910.269 for maintenance work and Subpart V of Part 1926 for construction. On the other hand, these standards do not, for the most part, address the safe design of electric power generation, transmission, or distribution systems. For hazards created by poor system design, OSHA would enforce the general duty clause for any recognized hazard. The NESC can provide evidence of industry recognition of hazards related to the design of electric power generation, transmission, and distribution installations. Thus, an employer who did not comply with a design provision in the NESC and who did not otherwise protect employees from the relevant hazard would risk a general duty clause citation. In addition, an employer who failed to protect employees from an electrical design hazard that was not addressed by OSHA standards or the NESC would still risk a general duty clause if the employer recognized the potential danger to employees.

It should be noted that the general duty clause does not impose a particular form of abatement for a hazard. An employer is free to protect employees by any suitable means. For example, an employer could remove employees from exposure to the possible effects of circuit breaker failure rather than installing a breaker with a suitable rating.

If you have any questions on OSHA electrical standards, feel free to contact me.

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[1] If the system is designed so that the circuit breaker will never have to interrupt a three-phase ungrounded fault, then that same breaker would be acceptable.

SWAT SCWG

October 26, 2006 Meeting

Agenda

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

1. **Introductions, Approval of Previous Meeting Minutes, and Update on Action Items**
2. **PTI to Aspen Conversion – Tom Field**
3. **Check of Member Cases – Ron Onate and Tom Field**
4. **WestConnect Map Work Proposal**
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7. **SWAT SCWG Task Force for East Nevada Short Circuit Study Group**
8. **Case Combination Preparation**
9. **Determine Location of Next Meeting**

Introductions

SWAT SCWG Members

Tom Field WAPA
Don Bryce USBR
Dennis Delaney 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
Kevin Salsbury - NPC/SPPC
Michael Gazda - APA
Bill Middaugh - CCPG Liaison

Approval of August 2006 Meeting Minutes

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
July 2006 Meeting Notes
August 2006 Meeting Notes
September 2006 Meeting Notes (unapproved)
October 2006 Agenda (draft)

Update on September Meeting Action Items

- **Person:** Tom Field
- **Action Item:** Show the August meeting minutes on the website as approved.

- **Person:** Steve Conrad
- **Action Item:** Send a drawing of the symbol for the converter stations to Tom F. for placement in the July meeting minutes.

- **Person:** Steve Conrad
- **Action Item:** Report on the status of the CCPG short circuit case and the activities of the CCPG short circuit group.

CCPG Update – September 27

Our fault study has been distributed to all the participants for their review and comment. Xcel has worked through the conversion to CAPE and seems satisfied with the results. Tri-State and other members have compared recent actual faults with the model and have seen good correlation. The Chair hasn't called a meeting yet to see if any problems have been found. The only other issues are a few mutual groups that need to be straightened out and the issue of maintenance. Tentative plans for maintenance were investigated at an early meeting, but nothing has been formalized. Presumably we'll do that at the next meeting.

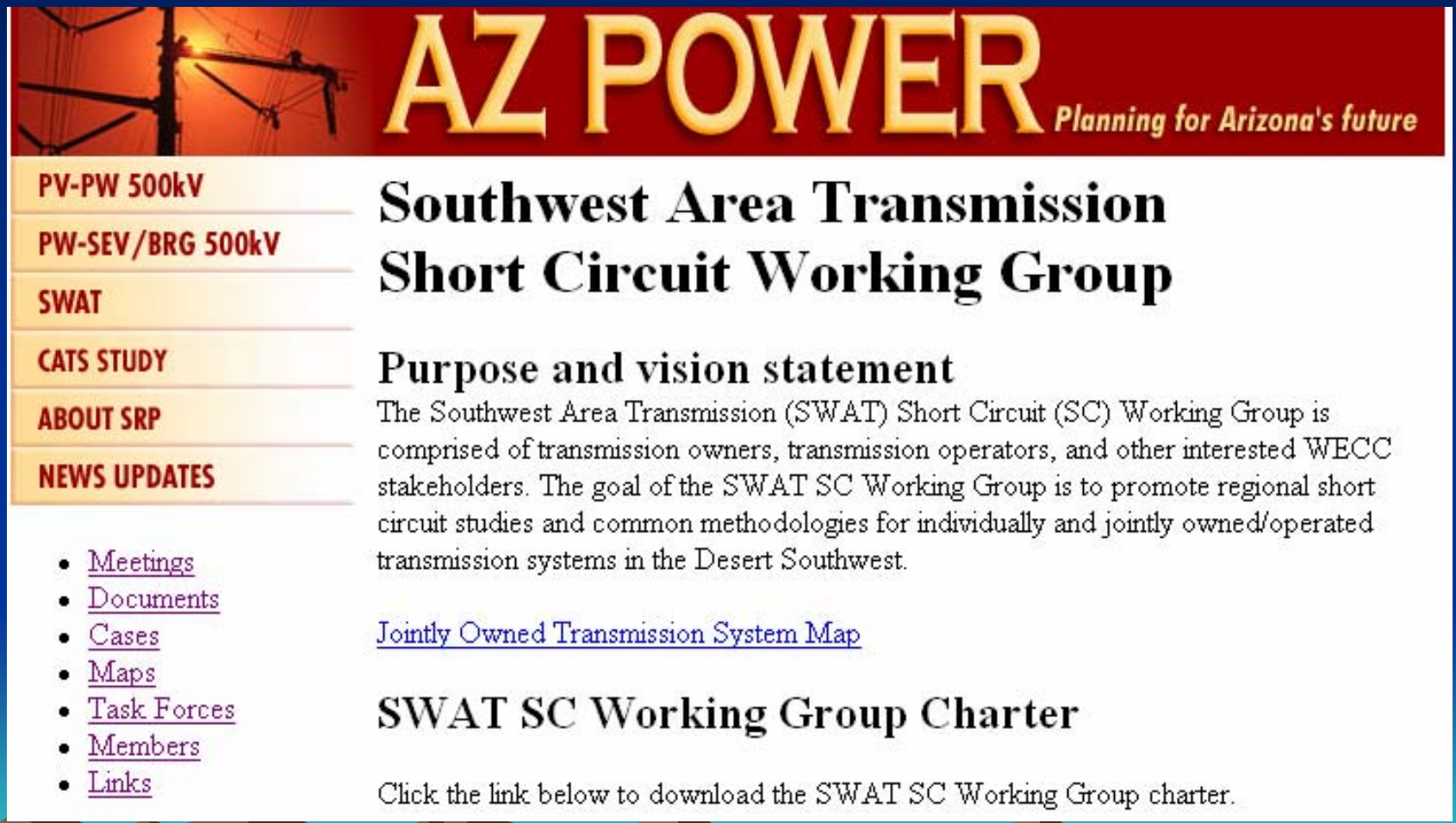
Update on September Meeting Action Items

- **Person:** Tom Field
- **Action Item:** Investigate the latest change made by Aspen which is supposed to take care of the transformer problems in the PTI to Aspen conversion.

- **Person:** Tom Field
- **Action Item:** Rerun the DPV2 case and check to verify that the charging was not set to zero originally since the screen shot showed the “set charging to zero” as checked for the new aspen transformer option comparison of PTI to Aspen.

- **Person:** Tom Field
- **Action Item:** Setup a links section on the webpage and place the IEEE PSRC, IEEE Switchgear, and WECC RWG links on it.

Links for Groups



Links for Groups

Links

IEEE Power System Relaying Committee (PSRC) website
WECC Relay Working Group (RWG) website
IEEE Switchgear Committee website

Update on September Meeting Action Items

- **Person:** Tom Field
- **Action Item:** Send Jorge B. the notes from the August 23 teleconference with SCE, SDGE, IID, and SWAT.

- **Person:** Jorge Barrientos
- **Action Item:** Let Tom F. know if there were any problems with sharing the CFE short circuit data with SDGE and SCE

October 23 Email

Tom, the IID's action item was to see if CFE is willing to share data for SWAT to perform short circuit analysis. Today, I spoke with Mr. Jose Santamaria (CFE System Planner Engineer) and said that they have no problem in providing system data for us to perform the necessary short circuit studies. CFE will provide data as low as the 69 kV level. The highest voltage level in their area is 230 kV. The data format is on PTI-PSS/E REV. #30.

October 24 Email Response

… Our intent is to combine our case with a Southern California case. However, we would prefer to have Southern California build their own case. To start this, we want SCE and SDGE to combine their case. SCE stated that if they combine their case with SDGE, the other utilities in Southern California will want to join. As a condition for SDGE to combine their case with SCE, they wanted SWAT to get CFE to join the process.

We have a lot of work to combine the SWAT area. Most of the SWAT area uses Aspen. The Southern California area uses PSS/E, Cape, and Aspen. Because of the amount of work, we would prefer to have Southern California build their own case that we would later combine with our case. We would like to have them put a mechanism in place for annual updates of their case. These annual updates would be combined with the annual updates of the SWAT case.

… I would like to arrange a conference call at some point after the meeting on Thursday with SDGE, CFE, SWAT, you, and me. In this teleconference, I would like to get SDGE and SCE to agree to combine their cases with CFE. I would also like to have them agree to combine their case with the SWAT case when they are finished. Finally, I would like to have them agree to provide annual updates of their case to SWAT. SWAT will agree to recirprocate this action. …

Update on September Meeting Action Items

- **Person:** Alex Fratkin
- **Action Item:** Alex will look into having NEVP/SPPC setup a webpage for the EN-SCSG.

- **Person:** Tom Field
- **Action Item:** Send out an email asking each member if they want to be on the EN-SCSG task force and if they would like to chair the task force.

- **Person:** Tom Field
- **Action Item:** Export the .wmf file for the impedance map from the IID case and place it on the website in encrypted format.

Impedance Maps

SWAT SCWG Impedance Maps

(All impedance maps are password protected)

2006 Combined Maps
WestConnect Proposal (SWAT draft)
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 (under development)

Update on September Meeting Action Items

- **Person:** Tom Field
- **Action Item:** Send out the agenda for the next meeting with the directions and information provided by NPC/SPPC.

- **Person:** Tom Field
- **Action Item:** Send the SWTC reclosing questionnaire to the members, compile the responses, and post them in an encrypted file on the website .

Update on September Meeting Action Items

- **Person:** Entire Group
- **Action Item:** Send in your current case in .dxt format to have conversion/error checked.

- **Person:** Maria Ramirez
- **Action Item:** Contact Steve C. and ask him to send in the PNM case.

- **Person:** Entire Group
- **Action Item:** Send in the areas and zones they want to use for their data.

Update on September Meeting Action Items

- **Person:** Entire Group
- **Action Item:** Send in the zones they want to use for their mutual zone, their equivalent zone, and their seams zone.

- **Person:** Entire Group
- **Action Item:** Start putting area and zone information in their case in preparation for the combining of the cases.

- **Person:** Entire Group
- **Action Item:** Send their information to Tom F. to changes the buses spreadsheet if they are an owner of a seams bus and want different information than in the WECC case.

- **Person:** Entire Group
- **Action Item:** Review their seams buses that they are the owners of in the WECC case and return any split WECC buses to Tom F. and indicate which lines are connected to them and the bus numbers they want to use for them.

Update on September Meeting Action Items

- **Person:** Tom Field
- **Action Item:** Change the buses spreadsheet to include any split bus information that members send in.

- **Person:** Entire Group
- **Action Item:** Identify their seams buses and send a revised list from the spreadsheet with just seams buses and indicate the names and numbers they want changed in the spreadsheet..

- **Person:** Entire Group
- **Action Item:** Change the names and numbers of their seams buses to match the spreadsheet names and numbers for the owners of the seams buses.

Update on September Meeting Action Items

- **Person:** Tom Field
- **Action Item:** Change the buses spreadsheet to include any changes that the members send in.

- **Person:** Tom Field
- **Action Item:** Put a branches sheet for all of the buses in the buses spreadsheet.

- **Person:** Tom Field
- **Action Item:** Show Alex the buses spreadsheet after the meeting and the methodology used for bus numbers.

Update on September Meeting Action Items

- **Person:** Alex Fratkin
- **Action Item:** Get Kevin S. to add bus numbers to the NPC case.

- **Person:** Entire Group
- **Action Item:** Add unique bus numbers to their buses that have a bus number of 0 and send in their case for the second round of error checking to be able to determine the number of buses with a difference of 100 A or more.

- **Person:** Tom Field
- **Action Item:** Generate a list of the types of errors to be fixed and send to everyone before they send their fixed cases back.

Update on September Meeting Action Items

- **Person:** David Gutierrez
- **Action Item:** Fix the problems in the EPE case identified and send the fixed case back to Tom F.

- **Person:** Entire Group
- **Action Item:** Make a list of the errors not in their data and identify whose data the error is in.

- **Person:** SRP
- **Action Item:** Fix the problems in the SRP case identified and send the fixed case back to Tom F. for a second round of error checking.

Update on September Meeting Action Items

- **Person:** SRP
- **Action Item:** Verify that the winding voltages on the 63 transformers identified with different winding voltages from base in Cape are correct.

- **Person:** Ron Onate
- **Action Item:** Fix the problems identified in the APS case and send the fixed case back to Tom F. for a second round of error checking.

- **Person:** Ron Onate
- **Action Item:** Fix the bus names and kVs that are duplicates in the APS Cape case.

Update on September Meeting Action Items

- **Person:** WAPA
- **Action Item:** Fix the problems in the WAPA case identified and send the fixed case back to Tom F. for a second round of error checking.

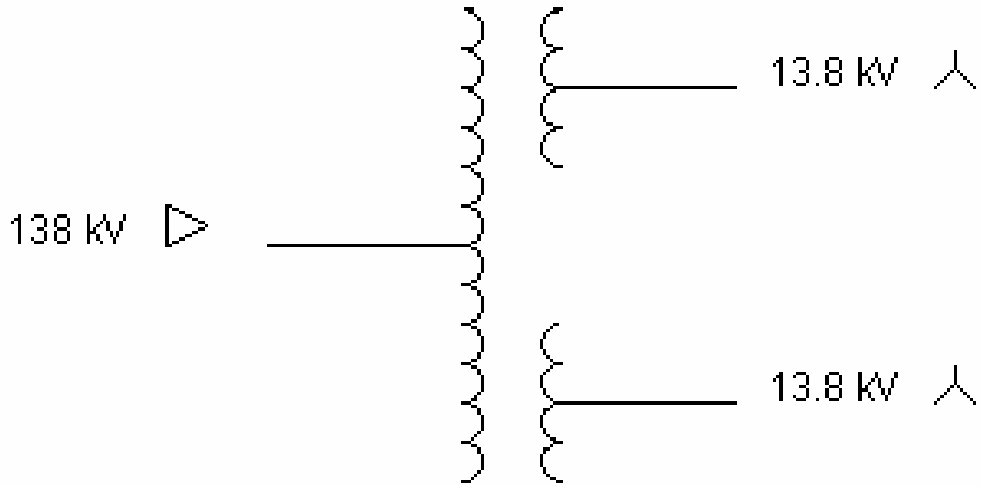
- **Person:** Tom Field
- **Action Item:** Contact TEP and ask them to correct the generator and transformer problems and send the case back.

- **Person:** Ron Onate and Tom Field
- **Action Item:** Perform a second round of error checking on the TEP case and generate the comparison spreadsheet .

TEP Email – October 24

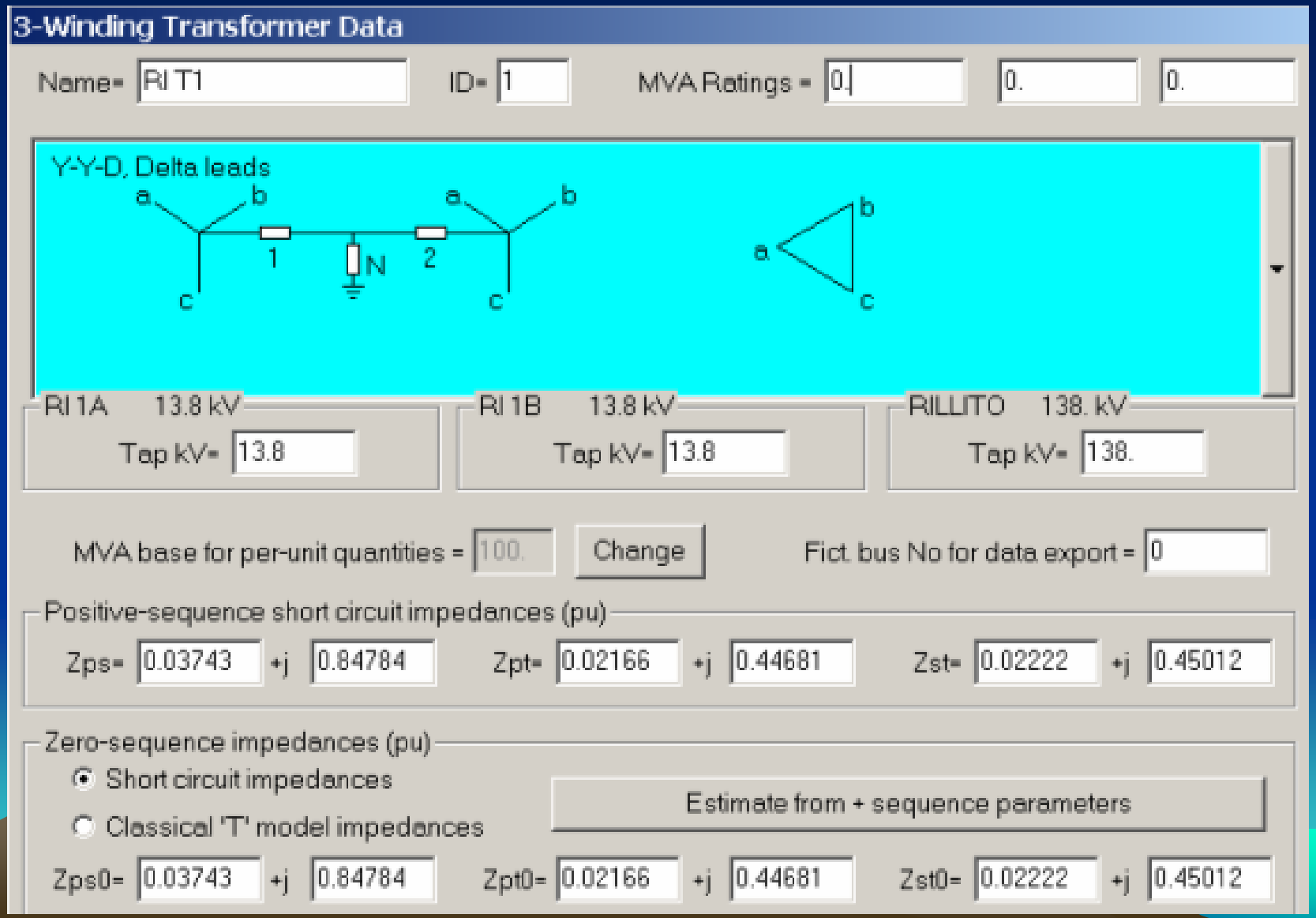
1. TEP Rillito T1 Transformer

This transformer is a little atypical for us. It is a 138 kV to 13.8 kV with a double secondary. A simple one line looks like this:



I verified the impedances are correct via the transformer test report. There was a mistake, in that the delta was indicated as lagging instead of leading, which I corrected. However, I don't think that in itself was causing you the problem. I've attached an ASPEN screen shot of the transformer data.

TEP Email – October 24



TEP Email – October 24

2. Casa Grande generator

This generator does not belong to TEP so I cannot comment on what the actual modeling should be. I believe it belongs to APS, so you should use their numbers. If you find out what the proper values should be, please let me know so I can update the TEP model.

Update on September Meeting Action Items

- **Person:** Ron Onate and Tom Field
- **Action Item:** Check the IID case and put it on the website.

- **Person:** Ron Onate and Tom Field
- **Action Item:** Have a teleconference with Aspen and Electrocon to try and get them to form an agreement to share information needed for data conversion between the two programs.

- **Person:** Ron Onate and Tom Field
- **Action Item:** Rerun the cases after Electrocon fixes the DD transformer conversion problem.

Electrocon Email – October 6

We are almost finished making the necessary changes to import/export DD and YD transformers tested as G. These changes will be available by the beginning of next week on our ftp site for downloading with update_cape. Let us know if you would rather have a new cd.

Update on September Meeting Action Items

- **Person:** Ron Onate
- **Action Item:** Develop a list of what characters are not accepted in Cape.

- **Person:** Ron Onate
- **Action Item:** Talk to Electrocon about changing the program to accept other characters in the member's names and report on it.

- **Person:** Ron Onate
- **Action Item:** Ask for the characters in the next response and add this to the teleconference discussion.

Update on September Meeting Action Items

- **Person:** Ron Onate and Tom Field
- **Action Item:** Look into the “secondary voltage difference more than 20” problem in the NPC case and determine what the message means and what the problem is.

- **Person:** Ron Onate
- **Action Item:** Look further into why 1 of the switches was not added in the APS log file and contact Electrocon if the report is incorrect.

- **Person:** Ron Onate
- **Action Item:** Ask Electrocon why the “winding voltage different from base kV” message is generated for a 5% difference.

Electrocon Email – October 6

The only remaining issues with the import/export of the data file you sent, epechang.dxt, concern two transformers. I think both of these problems are data errors.

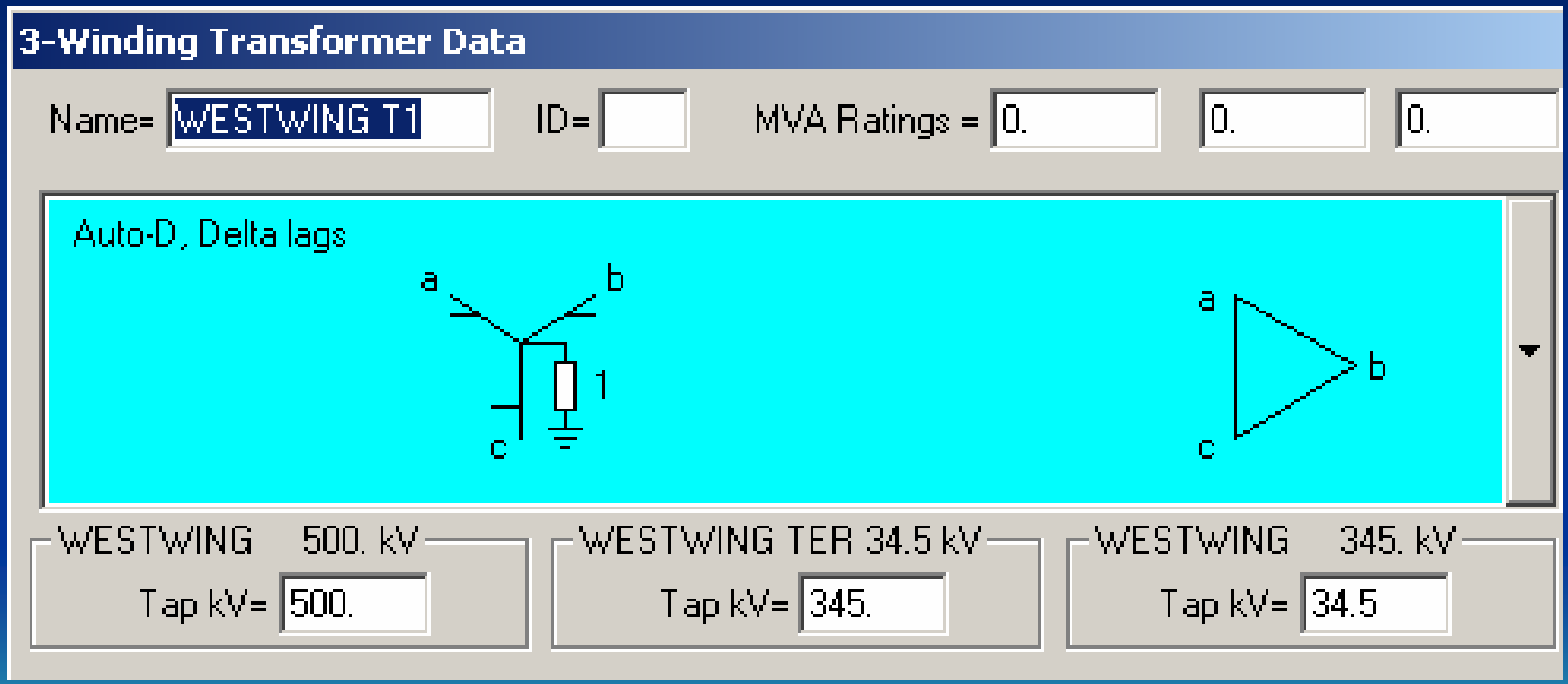
The first problem is at WESTWING. The three buses have base kv of 500/34.5/345, but the tap voltages are 500/345/34.5.

'WESTWING' 500 'WESTWING TER' 34.5 'WESTWING' 345 ' '= 1 0 'WESTWING T1' 500 345 34.5 1 /
0 0.0123 0 0.0955 0 0.083 0 0 0.0123 0 0.0955 0 0.083 0 G G D G D 0 0 0 0 0 0 0 0 0 3 0 0 0 0 100 0 0 0.51 1.5 0.00625 0.51 1.5 '' 0 0

I think the secondary and tertiary buses should be switched, as in:

'WESTWING' 500 'WESTWING' 345 'WESTWING TER' 34.5 ' '= 1 0 'WESTWING T1' 500 345 34.5 1 /

Westwing Transformer



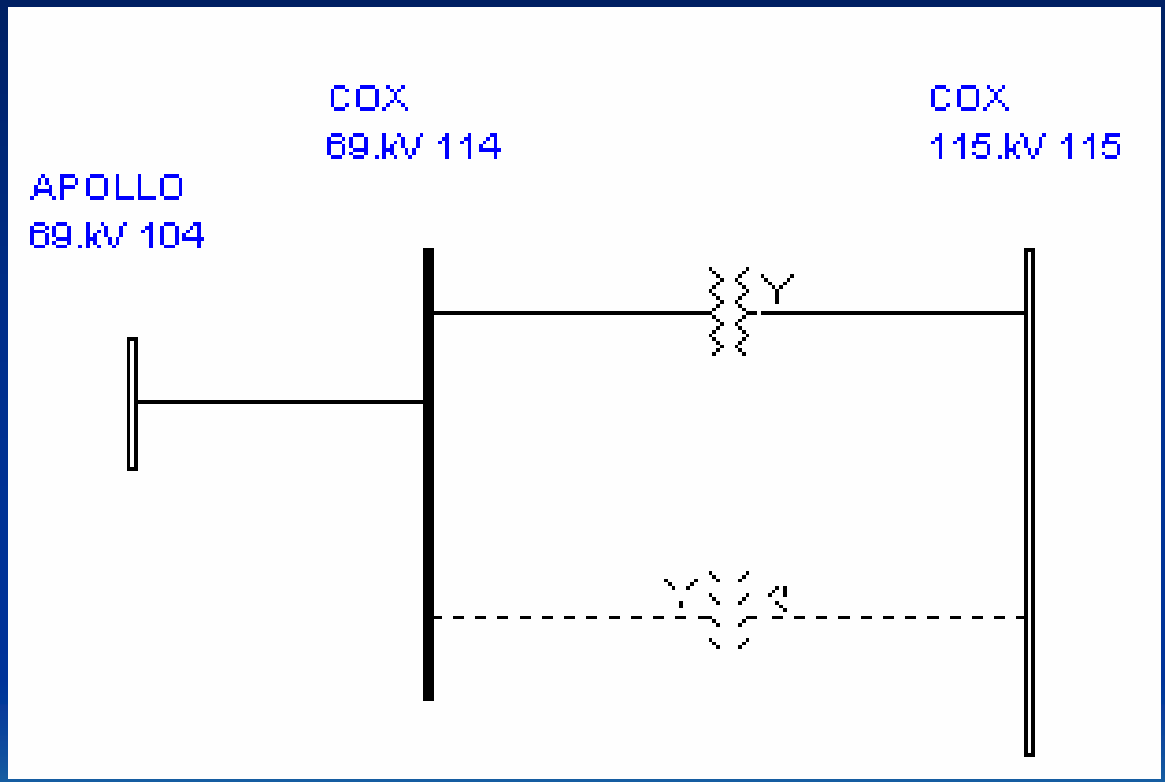
Electrocon Email – October 6

The second problem is at COX. There are two parallel transformers, though only one appears to be in service at a time. One is YD with a 30 degree phase shift and the other is YY without a phase shift. This is not necessarily incorrect, as long as only one is in service at a time, just suspicious.

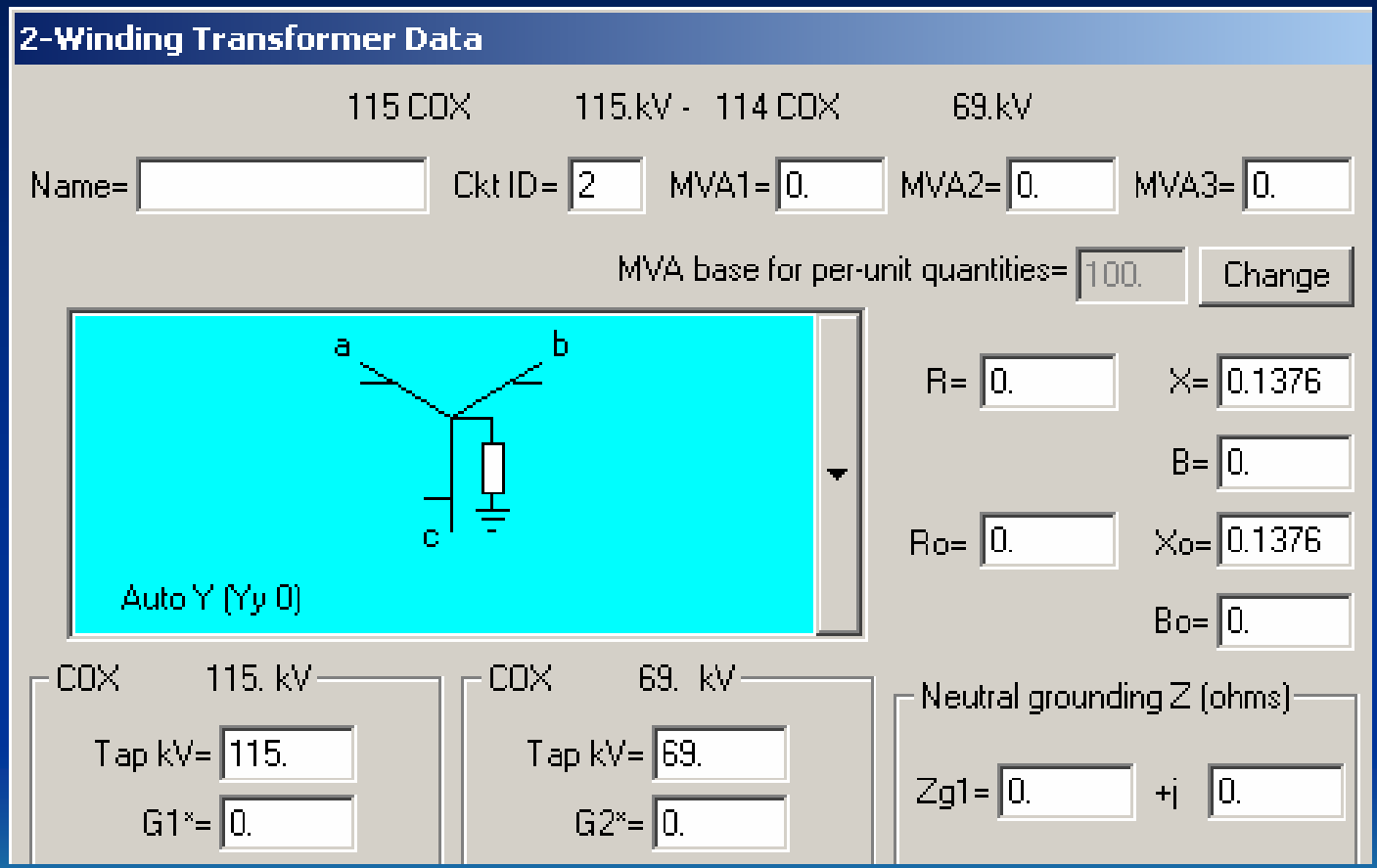
'COX' 69 'COX' 115 '1'= 0 0 'COX T1' 69 115 0 0 1.0041 0 0 1.0041 0 /
G E D 0 0 0 0 0 0 3 0 0 0 0 0 0.51 1.5 0.00625 0.51 1.5 " 0 /
0 0 0 0 0 0 0 0 100 0

'COX' 115 'COX' 69 '2'= 1 0 " 115 69 1 0 0.1376 0 0 0.1376 0 /
G G G 0 0 0 0 0 0 3 0 0 0 0 0 0.51 1.5 0.00625 0.51 1.5 " 0 /
0 0 0 0 0 0 0 0 100 0

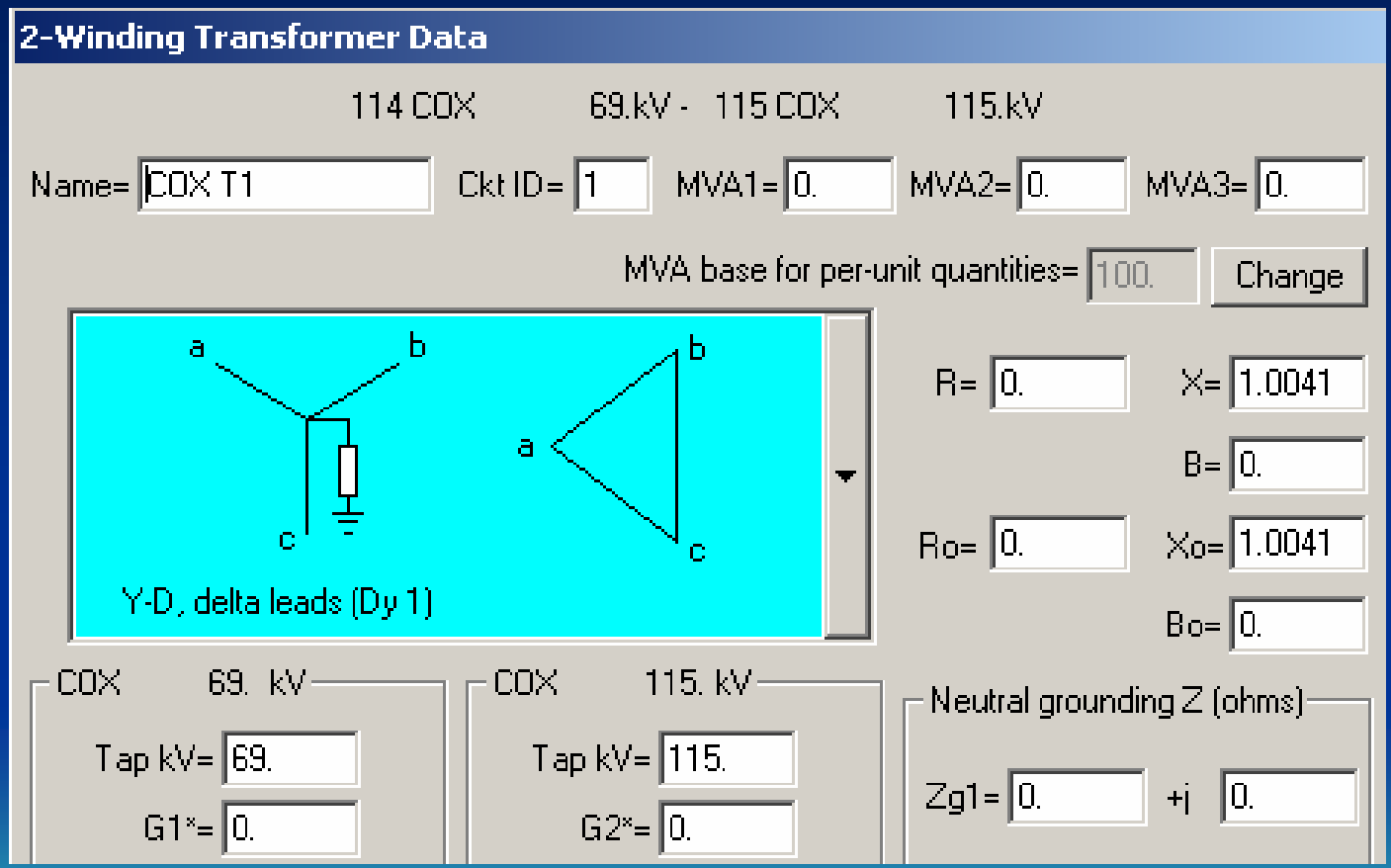
Cox Transformers



Cox Transformers



Cox Transformers



Update on September Meeting Action Items

- **Person:** Ron Onate
- **Action Item: L**ook at the 19 transformers with duplicate ckt, 19 neutral buses added, and 19 bus ties added in the SRP case to determine if they were the same.

- **Person:** Ron Onate and Tom Field
- **Action Item:** Look into the cause of the “end buses were not found on bus ties” warning message in the TEP case.

- **Person:** Ron Onate and Tom Field
- **Action Item:** Look into the cause of the “mutual couplings ignored because bus not found” warning message in the TEP case.

Update on September Meeting Action Items

- **Person:** Ron Onate and Tom Field
- **Action Item:** Look at what changed during the conversion process for the APS case to give the differences between the pre and post cases.

- **Person:** Ron Onate and Tom Field
- **Action Item:** Rerun the SRP faults after the meeting and look at the differences if they are the same to find out why there were differences between Aspen and Cape.

- **Person:** Ron Onate and Tom Field
- **Action Item:** Look at the differences in the Cape and post results for the WAPA case to find out what the differences are due to.

Update on September Meeting Action Items

- **Person:** Ron Onate
- **Action Item:** Discuss a plan for the equivalents checking work with Steve after the meeting.

Additional Action Items

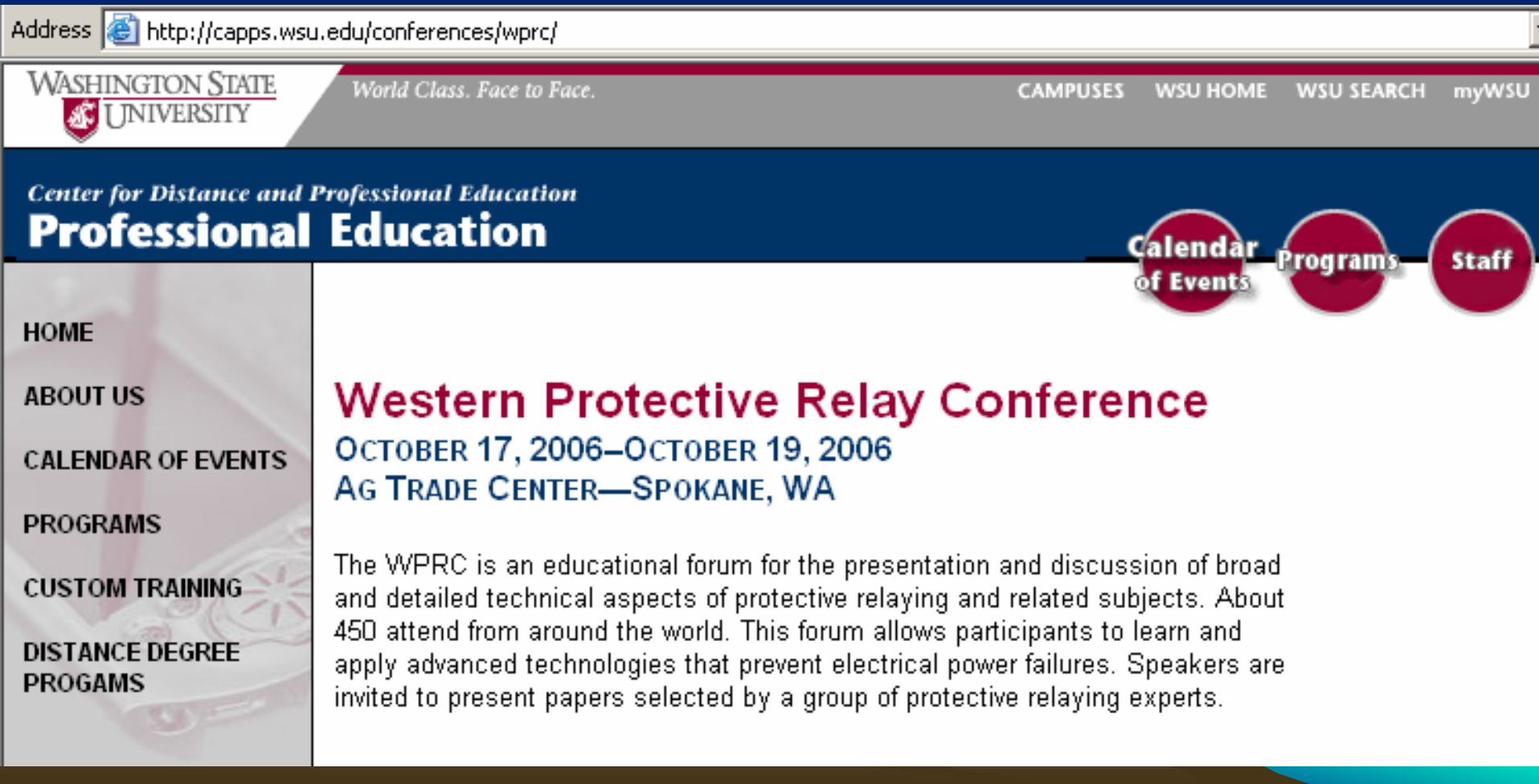
- Any other action Items not in draft Minutes?

New Items

- Aspen User Group Meeting at Western Protective Relay Conference – October 16

Western Protective relay conference

- http://capps.wsu.edu/conferences/wprc/



SWAT Update

- SWAT Meeting on October 18, 2006
- Ron Moulton gave update

SWAT Update – October 18

- WestConnect Map Proposal Information given to SWAT for presentation to WestConnect steering committee on November 1
- SCWG voted to form task force to participate in Eastern Nevada Short Circuit Study Group
- Initial check of cases with Cape showed most problems in cases are in areas represented that are not the owners – reinforces need for SCWG
- Electrocon agreed to make additional changes to Cape to solve problems in conversion
- Cape to Aspen conversion work nearly finished
- Only 2 problems left with Aspen to PTI conversion – problems identified and Aspen made change in program for one of them
- Members working on zones and common seams bus names/numbers for their cases in preparation for combining

SWAT Update – October 18

- Each member to have zone for mutuals, equivalents, and seams buses – identify each members sections in case for extraction/updating and joint member buses for combining – used for equivalent removal when case combined with other SCWG cases such as CCPG – used for mutuals between two utilities and mutuals on maps
- CFE, SDGE, SCE, and IID discussing combining cases in lieu of a STEP case
- Next meeting on October 26, 2006
- Will not hold meeting in November or December due to holidays and end of year projects – members will work on conditioning their cases during this time
- January meeting will be start of first combination to develop the method

IEEE Fall 2006 Switchgear Meeting

- Held October 2, 2006 through October 5, 2006 in Milwaukee, Wisconsin
- High Voltage Circuit Breakers Subcommittee meetings attended by Tom Field, WAPA and Brad Staley, SRP
- No known SWAT members at High Voltage Switches subcommittee, High Voltage Fuses subcommittee, Low Voltage Switchgear Devices subcommittee, Reclosers and Other Distribution Equipment subcommittee, and Switchgear Assemblies subcommittee

High Voltage Circuit Breakers Subcommittee

- Corrigenda for C37.04 and C37.09
- C37.06 revision
- CIGRE TRV working group A3-19
- New HVCB Specification Guide C37.12
- New Instruction Book Guide PC37.12.1
- Transformer and Circuit Breaker Interaction task force C57.142
- Other meetings

Corrigenda for C37.04 and C37.09

- Fix problems in C37.04 and C37.09 related to the IEC waveshape
- C37.04 Balloted prior to the meeting
- 89 comments submitted by Tom Field with a negative ballot
- Comments addressed in meeting
- C37.09 Balloted after the meeting

C37.04 comments

- 3 phase ungrounded fault not sufficiently covered
- Current standards violate NESC
- OSHA letter provided
- Agreed to change wording

C37.04 comments

- Short Line fault reduction not justified
- Previous justification showed d factor of 1.6 not sufficient for 69 kV with linear interpolation of German line data
- CIGRE WG A3-19 finished investigation of SLF and found 3 conditions where 1.6 is not sufficient
- Condition 1 – Low soil resistivity – rain reduces
- Condition 2 – Lower voltage lines on higher voltage structures
- Condition 3 – No overhead shield wire

C37.04 comments

- Transformer fast rate of rise standard C37.06.1 not referenced
- Concern about not having C37.06.1 parameters
- Sending out for reballot at end of October

C37.09 Comments

- 13 comments submitted by Tom Field
- Main issue with change in test duties not addressed due to limit on Corrigenda scope

C37.06 Revision

- Levels for TRV revisions and capacitor switching revisions
- Draft 7.8 b discussed
- Still controversy over capacitor switching levels
- Sending out new invitation to ballot

CIGRE WG A3-19

- Finished work and now need to publish CIGRE paper
- Found that 3 phase line faults have a problem for some source values at some distances on lines
- Will recommend the short line d factor be 2.4 to cover these faults
- The amplitude is higher for these faults, but the rate of rise is slower

C37.12 – HVCB Specification Guide

- Addressing ballot comments in Draft 6
- Addressed some comments and emailing out others
- Hope to resolve comments by Spring
- Most change comments from manufacturers

PC37.12.1 – Instruction Book Guide

- Draft 2 comments from members discussed
- Mainly change comments from manufacturers
- Issue of what kind of breakers should be covered – 1000 V and up versus requirements

C57.142 – Transformer and Circuit Breaker Interaction task force

- Teleconference with Transformer Committee
- Due to comments on ballot from Switchgear members
- Current chopping was incorrect
- Difference between restrike and reignition
- Harmonics from Electronic loads responsible for exciting resonance and not multiple reignitions
- Need guidance on when to apply – Electra Jan/Feb 2005 article
- New Par for joint sponsorship
- Losses in transformers need to be treated

Other Meetings

- Harmonization of Switch Standards- C37.30.1
- Utility Get Together
- HVCB Subcommittee meeting
- Switchgear Committee meeting
- X/R ratio paper

C37.30.1 – Harmonization of Switch Standards

- Combining high voltage switch standards C37.30, C37.32, C37.34, C37.36, C37.36b, and C37.37 into a single standard C37.30.1
- Continuing to resolve comments
- Resubmitting to editorial board before voting
- New working group for type testing for wind loading

Utility Get Together

- SF6 breaker failure from SCE
- Test Duty cycle problem – was O-CO with 15 second, but now 3 minutes
- Vertical Break disconnect switch problem from Ameren
- Successful solid state current limiter tests at Kema – ConEd presented

HVCB Subcommittee

- Nema SG4 being combined into C37.04 and C37.09 in future revision
- C37.013a and C37.013 going out for ballot in mid October – not on my ballot system – need email request to chairman
- Will start on guide for shunt reactors next meeting
- C37.081 test standard open for ballot
- C37.083 test standard open for ballot

HVCB Subcommittee

- C57.21 for dielectric stress imposed on shunt reactors during switching to be worked on with transformer committee

- C57.16 air core series reactors – annex on TRV – switchgear told outside of C57 scope – want to turn into joint working group paper

Main Committee

- C37.45 – enclosed air switches just passed
- C37.43 – capacitor fuses – out to ballot
- 1247 – recommended test portion be taken out
- C37.082 – sound pressure for breakers – dual logo with IEC
- 1036 – shunt capacitor application guide out to ballot
- C37.66 – capacitor switches – approved
- C37.74 – underground equipment – working group formed
- NEC article 490 causing changes in equipment

X/R Ratio Paper

- No work done since Fall 2005 meeting
- Brought in Mitsubishi to run ATP simulations because WAPA is currently “black listed”
- Reviewed all of sections of paper to be written
- Everyone in agreement that it is needed before C37.010 starts revision

Other New Items

- Any other new items not on the agenda since the last meeting?

PTI to Aspen Conversions

- No work done since last meeting

Check of Members Cases

- IID case waiting to be checked
- NPC sent in for 3rd round of error checking respectively
- EPE and TEP sent in for 2nd round of error checking
- PNM is the only case that has not been submitted
- List of errors to be checked to be generated after responses from Electrocon on some errors
- Electrocon has not answered all questions on errors yet
- Everyone to make list of errors not in their data
- Errors pointed out at last meeting still need to be checked

WestConnect Map Proposal

- Response sent to SWAT on September 29
- Next WestConnect Meeting on October 25

September 29 Email

Each of your 5 questions were discussed at the SWAT SCWG meeting on September 28. The group developed the following responses at the meeting yesterday. If you have any additional questions, please let me know. Thanks

Question 1:
Please provide more specifics on what is and what is not included

SWAT SCWG response:

The following is included:

* Development of a common set of impedance maps based on the combined SWAT SCWG 2007 case
* This proposal is only for the 2007 case maps
* One D size copy of the maps in black and white
* One 11"x17" three hole punched copy of the maps
* One CD for each of the SWAT SCWG members with drawings in editable AutoCad format

Question 2:

Is this a one-time funding request and SWAT will administer on-going costs or will there be on-going costs?

SWAT SCWG response:

This request is for funding the initial set of common impedance map drawings.

September 29 Email

Question 3:

The WC Steering Committee would like to place a limit on what they agree to fund … do we have a limit we can agree with?

SWAT SCWG response:

Our cost estimate was determined to be between $45 k and $80 k based on the best available data and methods.

Question 4:

How are we coordinating with CCPG and how does the SWAT initiative fit with the work of CCPG?

SWAT SCWG response:

* CCPG has a liaison with the SWAT SCWG that has been sent the teleconference information on our meetings and is on the mailing list for the SWAT SCWG.
* The SWAT SCWG has appointed Steve Conrad as the SWAT SCWG liaison with CCPG
* The SWAT SCWG has discussed with the CCPG group combining the SWAT SCWG case and the CCPG case

September 29 Email

Question 5:

Are we coordinating with others? How does that fit?

SWAT SCWG response:

* The SWAT SCWG has been working with the California utilities to develop a case that the SWAT SCWG would combine their case wtih.
* This combination would eliminate the need for equivalents on the Western boundary of SWAT

The group was a little unclear on exactly what WestConnect was looking for in some of the questions. However, they developed the responses above in five separate discussions. I hope this will be sufficient for your October deadline.

Areas and Zones in Cases

- Only 1 response on mutuals, equivalents, and seams zones
- No responses on seams buses
- No responses on bus number differences from WECC
- No responses on split bus information

Areas and Zones

Areas and Zones from April 20, 2006 WECC case 07hw1a.sav					
				Specific Use Zones	
SWAT SCWG Member	Owner	Area	Zones	Equiv.	Mutual	Seams
APS	2	14	141-147, 31,840-847			
SWTC	3	14	170 - 179			
WAPA	4	14	191-199	199	198	197
IID	16	21	210			
NPC	17, 18, 19, 20, 21, 22, 23, 24	18	181-188			
NPC (SPPC)	59	64	640-642, 644-648			
TEP	79	14	160, 164			
TEP (UES)	150	14	161-163			
SRP	80	14	150-159			
PNM (PN2)	129	10	101-107, 109, 130-132			
PNM (PN1)	130	10	100			
EPE	125	11	110			
Other New Mexico Entities:						
LAC	126	10	133			
PGT	127	10	120-123			
US	128	10	135			
NTU	131	10	108			
SPS	132	10	134, 116			
Other EPE Entities:						
CFE Mexico	111	11	117			
Other Nevada Entities:						
Valley Electric Association	25	18	189			

Equivalents

- Any updates?

SWAT SCWG Task Force for East Nevada Short Circuit Study Group

- Email sent on October 20 to solicit members and chair for task force
- No responses to solicitation yet
- Next EN-SCSG meeting date not known
- EN-SCSG webpage location not known

Case Combination Preparation

- Error Checking and Program Changes
- Equivalent methods
- Individual Case Development

Error Checking and Program Changes

- Determine problems in the programs and problems in the databases
- Obtain transparent conversions between SWAT member programs
- Identify needs for Individual Case Development

Equivalent Methods

- Determine how equivalents will be calculated to minimize error
- Identify methods for Individual Case Development

Individual Case Development

- Stage 1: Work that can be accomplished while Error Checking is being worked on
- Stage 2: Work that can be accomplished while the Equivalents Methods is being worked on
- Stage 3: Final work before combining cases

Stage 1 Work

- In Stage 1 today
- Areas and Zones work
- Bus Numbers work
- Bus Names work
- Problem Resolution work

Areas and Zones Work

- Step 1: Identify Zones range, Seams zone, Equivalents zone, and Mutual zone for all members to know. Also identify split seams buses.
- Step 2: Change zones in individual cases to match zones given to the group
- Step 3: Modify seams zones to other members seams zone numbers. Also make split seams buses that others have. This is for others.

Bus Numbers

- Step 1: Change buses with number 0 to unique bus numbers
- Step 2: Identify seams bus numbers
- Step 3: Modify seams bus numbers of others

Bus Names

- Step 1: Identify Seams bus names
- Step 2: Modify Seams bus names for others
- Step 3: Identify characters in bus names not acceptable to Cape
- Step 4: Modify all bus names that have characters not acceptable to Cape

Problem Resolution

- Step 1: Look at problems identified by Cape and Aspen
- Step 2: Fix problems for individual data in zones for individual as identified
- Step 3: Generate list of all problems to be solved

Stage 2 Work

- Step 1: Fix all remaining problems from final list in Error Checking for individual data in zones for individual
- Step 2: Identify where equivalents need to be generated
- Step 3: Obtain up to date data for equivalent sections

Stage 3 Work

- Step 1: Generate Equivalents using “Equivalent Methods” work methods

- Step 2: Final check of data – areas, zones, bus names, bus numbers, seams buses, problems, and equivalents

Determine Location of Next Meeting

- Not much work done since last meeting
- Holidays in November and December will cause problems with attendance
- End of year projects will cause problems with attendance
- Members have a lot of preparation work for the combining of cases
- Meet in January and start on combining cases as well as near completion on error checking and update on equivalents work

Next Meeting Location and Date

- January 19 is third Thursday in January
- January 16 is third Tuesday in January
- 3rd Thursday conflicts with Phoenix IEEE
- Steve C. prefers Tuesday over Thursday
- Date?
- Time?
- Location

Website address

- http://www.oatioasis.com/WALC/WALCdocs/page1.htm