SWAT SC Working Group Meeting
Thursday, September 28, 2006

Location: El Paso Electric Company, Room 4E, Centre Building

Time: 9:15AM-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 he would like to have an update on the action items of the previous meeting minutes, go over the PTI to Aspen conversion work, cover the error checking work, address an issue that has come up on the WestConnect map proposal, discuss the areas and zones, have some discussions and a vote on forming a task force for the East Nevada Short Circuit Study Group, and determine the time and location of the next meeting. The agenda was distributed and is attached to the end of these minutes.

There were 8 participants at the meeting, 2 participants on the teleconference, and 1 guest at the meeting. 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. Tom stated that Arizona Power Association (APA) requested membership. Tom stated that he passed the request through SWAT and they didn't have any objections. Tom asked if anyone disagreed with having APA as a member. Everyone agreed that APA should be allowed to become a member. Tom stated that the password for the files had previously been given to those members that submitted their impedance maps. He stated that APA will probably not have an impedance map or case to submit. Tom stated that the contact person on the website for APA, Michael Gazda, has a background in protection. Tom asked if he should be given the password. Everyone agreed that he should be given the password only after he submits a case. Everyone was asked to introduce themselves. The list of participants is attached at 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 stated that they were on a tight schedule at this meeting due to the East Nevada Short Circuit Study group, so he wanted everyone to review the meeting minutes as quickly as possible. 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 responses. Tom F. asked if anyone remembered whether responding to the recolser survey was an action item for the group. Nobody recalled this being an action item. Tom stated that if anyone saw anything in the meeting minutes before the next meeting that needed to be changed, to send him an email with the change and he would bring it up at the next meeting. 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 August 2006 minutes 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 F. to change the July meeting minutes to include the action item for everyone to put the areas and zones they want to use in their cases. Tom stated this had been done.

The next action item was for Tom F. to place the July meeting minutes on the website as approved after adding the areas and zones action item. Tom stated this had been done.

The next action item was for Steve C. 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 C. to report on the status of the CCPG short circuit case and the activities of the CCPG short circuit group. Tom stated that Steve was unable to make it to the meeting due to commissioning at a site, so this is still an open action item.

The next action item was for Tom F. to contact Steve C. and ask him to report on the IEEE PSRC meeting in September. Tom stated that he had sent Steve an email requesting this and left a voice message, so this action item was complete.

The next action item was for Tom F. to contact Mike A. and ask him to report on the IEEE PSRC meeting in September. Tom stated that he had sent Mike an email requesting this and his voice message box was full, so this action item was complete.

Tom stated that he had sent an email on August 23 to all of the members requesting a list of their IEEE PSRC members and participants. Tom stated that he had attached the 2006 IEEE PSRC membership list, but there were no companies listed for the members. Tom stated that he had received no responses. Tom asked if the website should have links to

the groups related to short circuit applications. Tom showed a webpage with links to the IEEE Switchgear Committee website, the IEEE Power System Relaying Committee (PSRC) website, and the WECC Relay Working Group (RWG) website. Tom stated that these are the 3 groups identified so far as having information that would be useful to all of the members on short circuit applications. Everyone agreed that the links should be placed on the website after the SWAT SCWG members list. As an action item, Tom F. stated that he would setup a links section on the webpage and place these three links on it. Tom F. did not state whether or not the list of members and participants in these groups that are employed by the members of the SCWG would also be placed on the website.

The next action item was for Robert Sanders to send in the IID impedance maps to place on the website. Tom stated that IID had sent in their case in .olr format. Tom asked Jorge B. with IID if the impedance map was in the Aspen file that he had provided. Jorge stated that it was. Tom asked if Jorge wanted him to export the map to a .wmf file from Aspen to place on the website. Jorge stated that he did. As an action item, Tom stated that he would export the .wmf file for the impedance map from the IID case and place it on the website in encrypted format.

The next action item was for Tom Field to discuss the access of the material on the website further with IID after the meeting and call Robert S. on August 18 to discuss the access to the material further. Tom stated that he had discussed the access of the material with IID after the last meeting. Tom stated that one of the issues that IID had was how equivalents with SCE and SDGE would be handled in the future. Tom stated that there was a teleconference on August 23 with IID, SWAT, SDGE, SCE, and himself. Jorge stated that IID wanted clarification of the legal issue of access to the material and who else would have access. Jorge asked for the notes from the teleconference. As an action item, Tom stated that he would send Jorge the notes from the August 23 teleconference. Tom stated that during the August 23 teleconference, SCE stated they would poll the utilities in southern California to determine if they were interested in combining cases. Tom stated that SCE had told him that there was not much interest, so they would look into combining their case with SDGE. Tom stated that after further discussions with SCE, they stated that SDGE may be willing to do this if IID could get CFE to join. Tom stated that he had asked IID to contact CFE about doing this. Jorge stated that Jose Santa Maria with CFE in their operations planning said there should be no problem doing this. He said that the only question at this point was what level of data they can provide in the case. Tom stated that they would like to have coverage down to the subtransmission level. Jorge said that Jose would talk to the manager about the level on Friday. Jorge said that he would let Tom know if there were any problems with sharing the short circuit data.

The next action item was for Don A. to check with Dennis D. and let Tom F. know if the SWRTA contact information on the website should be changed. Tom stated that Don had told him that the contact information should remain the same.

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 some work had been done on this and it would be covered in

another agenda item specifically on the PTI to Aspen conversion. This is still an open action item.

The next action item was for the entire group to send in their current case in .dxt format to have conversion/error checked. Tom stated that IID had sent in their case, so the only one left was PNM. This is still an open action item.

The next action item was for Maria R., Ron O., and Tom F. to check the conversions for all .dxt cases and generate the warning files and comparison spreadsheets which will be sent back to the case owners and posted on the website. Tom asked Jorge if it was ok to place the IID case on the website. Jorge stated that this would be ok. As an action item, Ron and Tom will check the IID case and put it on the website.

Tom stated that several of the next action items were on case checking and would be covered in more detail during the check of members' cases agenda item.

The next action item was for Ron O. to call Electrocon and have them work out the DDD transformer problem with Aspen. Tom stated that this action item had been resolved.

The next action item was for Tom F. to call Aspen and have them work out the DDD transformer problem with Electrocon. Tom stated that this action item had been resolved.

The next action item was for Ron O. to check the DDD transformers in the SRP case to see if they were phase shifters after the meeting. Tom stated that Ron found that they were not.

The next action item was for Ron O. to get the information on the transformer tests in the standards and send it to Tom F. to put in the July meeting minutes as an attachment. Tom stated that this had been done, but the information could not be placed in the meeting minutes because it was protected by copyright.

The next action item was for Ron O. to look at the transformer test connection changes in the cases. Tom stated this had been done.

The next action item was for Ron O. and Tom F. to have a teleconference with Aspen and Electrocon if Ron finds the transformer test connections to be a problem and have them get the problem resolved. Tom stated that this had been done in two separate calls with the vendors.

The next action item was for Tom F. to check the pre and post .dxt files for the EPE cases and determine whether or not the transformers had been changed or if these were just warning messages. Tom stated this had been done.

The next action item was for Ron O. and Tom F. to look at the problem of transformers with root 3 removal converted from DDY to DDD in cases and call Electrocon. Tom stated that this had been done.

The next action item was for Ron O. to find out why17 transformers with winding kV different from the base kV in the NPC case were not listed. Ron stated that the new report with more details did list these. Therefore, this was not looked into further.

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. Maria R. stated that this had not been completed, but would be by the next meeting. This is still an open action item.

The next action item was for Ron O. to check the SRP case again with the ignore prefault setting in the SC preference and determine if this will eliminate the winding voltage different from base kV error messages. Ron stated this had been done.

The next action item was for Ron O. to look into why the 2 neutral buses in the EPE case were added. Ron stated this had been done.

The next action item was for Ron O. 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 that Electrocon had not answered this question yet. This is still an open action item.

The next action item was for Ron O. to develop a list of what characters are not accepted in Cape. Ron stated that Electrocon had not answered this question yet. This is still an open action item.

The next action item was for Ron O. to talk to Electrocon about changing the program to accept other characters in the member's names and report on it at the next meeting. Ron stated that Electrocon had not answered this question yet. This is still an open action item.

The next action item was for Ron O. to rerun the NPC case and see if there was another log file created with more details which was referenced in the singularity warning. Tom stated this had been done.

The next action item was for Ron O. to find why 1 of the switches was not added in the APS case. Ron stated this was not an issue. Ron stated that there were 290 switches in the case, but only 289 in the log file. He said that it appeared that the log file was off by 1. As an action item, Ron stated that he would look further into why and contact Electrocon if the report is incorrect. This is still an open action item.

The next action item was for Ron O. to fix the bus names and kVs that are duplicates in the APS Cape case. Ron stated that he had been too busy with checking the other cases to do this yet. This is still an open action item.

The next action item was for Ron O. 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 been too busy with checking the other cases to do this yet. This is still an open action item.

The next action item was for David G. to fix the problems in the EPE case identified and send the fixed case back to Tom F. for a second round of error checking. David stated that some of the errors were not in his data. This is still an open action item.

Tom stated that some of the errors were not errors in the members' data, but were errors in adjacent systems that they had in their model. Tom stated that when the cases were combined, these errors would be eliminated if it was errors in representation of other members' data. Maria R. stated that we should have a list of the errors not in our data so others will know that they may have an error in their data. As an action item, everyone will make a list of the errors not in their data and identify whose data the error is in.

The next action item was for NPC to fix the problems in the NPC case identified and send the fixed case back to Tom F. for a second round of error checking. Tom stated this had been done, but there were several problems that had not been fixed yet. Tom stated these would be covered later when the checking of cases was covered.

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. This is still an open action item.

Maria R. stated that she was unsure which types of errors were problems that should be fixed. As an action item, Tom F. stated that he would generate a list of the types of errors to be fixed and send to everyone before they send their fixed cases back.

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 been too busy with checking the other cases to do this yet. This is still an open action item.

The next action item was for Ron O. and Tom F. to get together and rerun the faults to get the settings the same for matching the cases in a comparison. Tom stated this had been done.

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 WAPA was the only case so far that had done this. 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 not everyone had done this yet. 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 that he only had one response so far. This is still an open action item.

The next action item was for Tom F. to point out at the next meeting who has responded with the .dxt cases as well as the area and zone information and who hasn't. The webpage with the case links was shown. Tom stated that he had received the IID case, so the PNM case was the last one that needed to be sent in. As an action item, Maria R. stated that she would contact Steve C. and ask him to send in the PNM case. Tom stated that because the mutual, equivalent, and seams zones were needed from all but one of the members, he would respond that only WAPA has sent in their area and zone information even though the majority had sent in their zone ranges.

The next action item was for the entire group to 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. Tom stated that he had no responses yet. This is 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 he had no responses yet. This is still an open action item.

There was some discussion about the seams buses that lead to two action items. As an action item, everyone will 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. As an action item, everyone will change the names and numbers of their seams buses to match the spreadsheet names and numbers for the owners of the seams buses.

The next action item was for Tom F. to change the buses spreadsheet to include any changes that the members send in. Tom stated that he had not received any changes. This is still an open action item.

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

The next action item was for Tom F. to setup a column in the area and zone spreadsheet for the mutual zone, the equivalent zone, and the seams zone for everyone. Tom stated this had been done.

The next action item was for Tom F. to put a branches sheet for all of the buses in the buses spreadsheet. Tom stated this had not been done yet. This is still an open action item.

The next action item was for the entire group to start putting area and zone information in their case in preparation for the combining of the cases. Tom stated that a few members had either done this or had started doing this. This is still an open action item.

The next action item was for Ron O. to discuss a plan for the equivalents checking work with Steve after the meeting. Ron stated this had not been done yet. This is still an open action item.

The next action item was for Tom F. to attach the equivalents user group handout to the June 2006 meeting minutes and place it on the website. Tom stated this had been done.

The next action item was for Tom F. to send the SWTC reclosing questionnaire to the members, compile the responses, and post them in an encrypted file on the website. Tom stated this had been done, but not all the responses had been received yet. This is still an open action item.

Tom showed the link to the survey on the website. Tom showed the questions next. Tom stated that he had received 2 responses. Tom encouraged everyone to respond to the questions and send in their responses. Tom stated that other members may need survey information in the future and it would be helpful to everyone to participate.

The next action item was for Alex F. to submit a scope document to the SWAT SCWG prior to the next SWAT SCWG meeting which would include the time line for the group, the methodology to be used for the study, and what is expected to be accomplished. Tom stated this had been done.

The next action item was for Tom F. to send the Eastern Nevada SCSG scope to the members for discussion with their management prior to the next meeting after receiving it from Alex. Tom stated this had been done.

The next action item was for Tom F. to place the Eastern Nevada SCSG presentation in the meeting minutes. Tom stated this had been done.

The next action item was for Tom F. to place the Eastern Nevada SCSG presentation on the webpage next to a dead link for the Eastern Nevada SCSG until they have an active webpage. Tom stated this had been done.

The next action item was for Alex F. to contact Tom F. before the next meeting and either give Tom the link for the webpage or ask Tom to setup a webpage for him. Tom stated that Alex had asked him to setup the webpage. Tom stated that he could do this, but another member suggested that he ask Alex to try to get his IT department to do this

based on the amount of work that Tom had to do for the SWAT SCWG. As an action item, Alex will look into this again.

Tom showed the webpage with the Eastern Nevada Short Circuit Study Group information under the SWAT SCWG task forces section.

The next action item was for the entire group to discuss the Eastern Nevada SCSG proposal with their company and determine if they want the group to form a task force and if they want to be a member of the task force or have someone different on it. Tom stated that this will be covered during the agenda item on SWAT SCWG Task Force for East Nevada Short Circuit Study Group.

The next action item was for the entire group to be prepared for a vote at the next meeting on forming a task force to participate in the Eastern Nevada SCSG. Tom stated that this will be covered during the agenda item on SWAT SCWG Task Force for East Nevada Short Circuit Study Group.

The next action item was for Tom F. to get the NTAC, STEP, and CAISO contact information for Alex and suggested that he also present his proposal at the next SWAT meeting. Tom stated that this had been done and a presentation had been given to NTAC and STEP. Tom stated that SWAT was also contacted and a presentation was given to MPP. Tom stated that another presentation had been arranged for WATS.

The next action item was for Tom F. to ask Dave G. for a 1 hour time slot for the Eastern Nevada SCSG to have their meeting. Tom stated that this had been done and the EN SCSG would meet for 1 hour after the SWAT SCWG meeting.

The next action item was for Tom F. to check the flight schedules and arrange the September meeting time such that everyone can make it there and back in one day. Tom stated this had been done.

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

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 August 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 that WestConnect held a meeting on September 21, 2006 at which SWAT presented the SWAT SCWG map proposal. Tom stated that WestConnect requested

additional information for the map proposal. Tom stated that he wanted to go over the request and develop responses during the WestConnect Map Work Proposal agenda item.

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 checked the change that Aspen made for the transformer problem. He stated that the zero impedance line differences still need to be worked on with PTI and Aspen.

Tom showed the new Aspen screen with the Transformer line shunts option. He stated that he ran it with the transmission line G+jB unchecked and the transformer line shunts unchecked. Tom showed the PTI options and said that the classical short circuit assumptions should be chosen, set tap ratios to unity should be chosen, and set shunts to zero in positive sequence should be chosen. Tom stated that the set charging to zero should be unchecked. As an action item, Tom stated that he would rerun this and check to verify this was originally done since the screen shot showed the set charging to zero as checked.

Tom stated that the results were 134 buses with 100 A or greater difference. Tom stated that he had not looked at the buses with 100 A or greater difference yet to determine which ones are not an issue and what the causes of the remaining ones were. Tom stated that there were still some zero impedance line differences that had not been worked out yet. 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 F. stated that 2 of the previous 5 cases analyzed had been changed and sent in for a second round of error checking. Tom stated that 4 additional cases had been sent in to be checked for the first time. Tom stated that there was only 1 case that had not been submitted.

Tom F. stated that he met with Ron O. on two separate days in September to work on action items, checking the revised cases, and checking the new cases. Tom F. stated that issues to be resolved were sent to Electrocon in an email on September 21. Tom stated that he had rerun all the comparisons of the previously checked cases after the settings refinement was found. Tom stated that he had also manually altered the spreadsheets for some of the cases that had multiple zero bus numbers to get good comparisons. Tom stated that he had placed all of the new comparison files, the revised error files, and new case files on the website.

a) Action Item Details

Tom stated that the DDD transformer action item had been resolved. He stated that Ron contacted SCE and they believed that the transformer in the DPV2 case was incorrectly modeled and should have been a DDY transformer. Tom stated there were no DDD transformers found in the members' cases. Tom stated that because there were no DDD transformers, Ron and he had decided that they would not continue trying to get Electrocon and Aspen to fix the DDD transformer conversion problem unless IID, PNM, or others later have DDD transformers.

Tom stated that the SRP transformers were checked and there were no DDD transformers. Tom stated that the Cape message was for a DD connection with a D test. Therefore, there were no DDD transformer problems in the SRP case.

Tom stated that for the action item of looking at the transformers with a root 3 removal converted from DDY to DDD, they found that this was a problem for DD transformers. He stated that Cape removes the root of 3 in the conversion to match the results. Tom stated that when Cape converts the case back to Aspen, the test connection is D and Cape does not remove the root of 3 difference that it changed to match Aspen. Tom stated that the result is that there is a difference of a factor of 3 between the Aspen case before conversion and the Aspen case after Cape converts it back. Tom stated that the root 3 removal and Y to D conversion is actually done in the Aspen to Cape conversion and showed the Log1 file with this. Tom stated Ron and he talked to Jeff with Electrocon on September 15 and Jeff agreed to fix the problem in Cape. Tom stated that at the end of the second day of error checking, Ron sent an email to Electrocon with the issues to be resolved. Tom showed the response from Electrocon stating that they would fix the problem, but they were not sure how they were going to fix it yet. An additional response was shown in which Electrocon identified how they would fix the problem and stated that it would be fixed in the next release. Tom showed where Electrocon stated how the problem could be manually fixed and an example they gave, but this is not what the group wants to do. In this response, Tom pointed out that Electrocon stated that they do not have information from the Aspen manual to explain the details for exporting the data. Tom stated that previously Aspen had stated they did not have information from Electrocon for converting their data. Tom stated that it seems like the two need to talk to each other and share information on the format of each program so their conversion programs can be fixed. As an action item, Tom and Ron stated they would 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 that they would rerun the cases after the fix is made.

Tom stated that for the transformer test standard action item, Ron showed him the information that he had. Tom stated that this was information on pages 31 and 32 of IEEE standard C57.12-1999 which is copyright protected. Tom stated that he could not put this information in the meeting minutes because of the copyright protection. Tom stated that this information was on the zero sequence impedance test connections and showed a hard copy of the section.

Tom stated that for the action item of checking the pre and post .dxt files for the EPE case to determine if the transformers had been changed or if the messages were just warnings, Ron and he found that the Cape warning messages are created for all 3 winding auto-transformers with a delta tertiary. He stated that the results do not appear to be affected by these warning messages. An example of this warning message from the log1 file was shown. Tom stated that Electrocon was asked to explain why these warning messages were generated in the email sent after the last day of checking the cases and showed this question.

Tom stated that for the action item of finding out why 17 transformers with different kV from the base kV in the NPC case not being listed, Ron and he found that cape gives a warning message on all transformers that have a tap set other than base voltage. He stated that the results do not appear to be affected. He stated that as an example, a transformer with a 525 kV base was set on a 500 kV tap. He showed this transformer in Aspen. Tom stated that the members should check these to verify that they are on the right tap.

Tom stated that for the action item of checking the SRP case again with the ignore prefault setting in the SC preference to determine if the winding voltage different from base kV error messages could be eliminated, Ron found there was no option in Cape to ignore the prefault voltage. He stated that Ron found the only prefault ignore option was for prefault current mismatch. He stated that Ron found that using the set voltage profile off by setting voltage multiple to 1.0 to remove the prefault solution did not appear to have an affect on the short circuit calculations in Cape. Tom stated that Electrocon was asked why Cape generates a warning message when there is a difference between the tap voltage and base voltage in transformers. Tom showed the response from Electrocon which stated that when the ratios were off by more than 20%, the error message was generated. Tom stated that in the example of the 525 kV base and 500 kV tap, the difference is only 5% which contradicts the response from Electrocon. As an action item, Ron will ask Electrocon why this message is generated for a 5% difference. Ron stated that he would send all of the issues for Electrocon to respond to at the same time. Tom showed an example that Electrocon sent back with a 345 kV tap on a 230 kV base and stated that this did not appear to be from our cases.

Tom stated that for the action item of looking into why 2 neutral buses were added in the EPE case, Ron and he found that Cape adds a bus when a neutral grounding impedance is used. He stated that the neutral grounding impedance is turned into a separate transformer shunt in Cape connected to a separate bus. He stated that Cape does not tell what transformer the bus is connected to. He stated that this did not appear to have an affect on the solution. Tom stated that the neutral impedance was added back to the transformer when the case was converted back to Aspen. Tom showed the log1 file from the Aspen to Cape conversion which showed where the neutral buses were added. Tom showed the Cape transformer reference numbers given in the log files and said that these numbers have no relation to Aspen numbers, so it is not possible for an Aspen user to determine which transformers these shunts have been added to. Tom stated that Electrocon was asked if they could identify the bus numbers where the shunts are added in the email sent on the last day of error checking and showed this question.

The meeting was adjourned at this point for lunch from 11:50 am to 12:35 pm.

Tom stated that for the action item of looking at the 19 transformers with duplicate ckt, 19 neutral buses added, and 19 bus ties added in the SRP case, Ron and he did not know why the duplicate messages were identified. He stated that some messages were for duplicate line and transformer and others were for duplicate transformers. He showed an example and stated that the Cape numbers referenced were internal to Cape and do not correlate to Aspen, so it was not possible for an Aspen user to know what these messages were referring to. He stated that Ron and he could not identify these even with Cape, so they did not know what these messages were for. He stated that Electrocon was asked to explain these messages in the email at the end of the last day of error checking and showed this request.

Tom stated that for the action item of making a list of the characters that Cape did not accept in names and for the action item of talking to Electrocon about changing the program to accept other characters that are in the names in the member's cases, Electrocon was asked about this in the email sent at the end of the last day of error checking and showed these questions. Tom stated this is still an open action item. As an action item, Ron stated that he would ask for the characters in the next response and he would add this to the teleconference discussion.

Tom stated for the action item of rerunning the NPC case to see if there was another log file with more details referenced in the singularity warning, Ron generated a file which contained the details of the singularities. Tom stated the file r1log1 in the NPC case files on the website contained the details of the rerun case. Tom stated that the revised NPC case was used to generate the log file. Tom showed the singularity details in this file.

Tom stated that the action item of finding out why 1 of the switches was not added in the APS case was still an open action item as discussed earlier in the action item part of the agenda.

b) New Cases Checked

Tom stated that the TEP, SWTC, and SWRTA cases had been checked since the last meeting and were on the website. Tom stated that the SWRTA case currently contains the ED3 case, but others will be added as they are built. Tom stated that he would go through the details of the problems found in each of these cases as was done for the previous cases in the last meeting.

Tom stated that for the TEP case, there were 4 two winding transformers that had root 3 removal and DDY to DDD test connection changes as shown in the log1 file. Tom stated this is a problem with the Cape conversion that Electrocon is fixing. Tom stated there were 14 neutral buses and 15 shunts added as shown in the log1 file. Tom stated this is simply the transformers with grounding impedances which is not a problem. Tom stated there was 1 duplicate line/xfmr ckt message as shown in the log1 file. Tom stated the

reason for this problem is not known yet and Ron is waiting for a response from Electrocon. Tom stated there were 2 generators that were offline as shown in the log1 file. It was stated that sometimes people put the emergency generators offline. Tom stated that they would determine how to handle the emergency generators during the common methodologies development and would leave these offline, but inform TEP about the generators in the event they should be online. Tom stated there were 9 switch names changed, 186 line names changed, and 133 transformer names changed as shown in the log2 file. Tom stated this is due to the problem with Cape not accepting some characters and Ron is waiting for a list of acceptable characters from Electrocon. Tom stated there were 9 warnings that end buses were not found on bus ties as shown in the log2 file. Tom stated this was a new warning message that did not appear in any of the other case files. As an action item, Tom and Ron will look into the cause of this warning message. Tom stated there were 37 transformers with winding kV/base kV differences as shown in the log2 file. Tom stated the explanation of this warning message was waiting further clarification from Electrocon because their comment about it being generated for 20% above did not cover all instances of the message. Tom stated there were 4 mutual couplings ignored because bus not found as shown in the log2 file. Tom stated this was a new warning message that did not appear in any of the other case files. As an action item, Tom and Ron will look into the cause of this warning message. Tom stated there were 4 buses with singularities as shown in the log2 file.

Tom stated that there was an error reading the file for the post generation after Cape converted the case back to Aspen. Tom stated that because of this, a comparison spreadsheet could not be generated. Tom stated that the errors were shown in the file post1.rep. He stated that one of the errors in the file was one or both generator impedances are zero for one generator. Tom stated this is similar to the error that NPC had in their initial file that had been corrected for their second round of error checking. Tom stated the other error was illegal winding conf. in use of transformer. Tom stated this was a new error which indicated which transformer had a problem. As an action item, Tom will contact TEP and ask them to correct the generator and transformer problems and send the case back. As an action item, Ron and Tom will perform a second round of error checking on the case and generate the comparison spreadsheet.

Tom stated that for the SWTC case, there was 1 generator at bus 277 that was offline as shown in the log1 file. Tom stated there were 2 bus ties added as shown in the log1 file. Tom stated there was one line with a name change as shown in the file log2. Tom stated there were 2 groups of singularities in the positive sequence as shown in the file log2. Tom stated there were 8 groups of singularities in the zero sequence as shown in the file log2. Tom stated that the singularities are usually offline equipment.

Tom stated that the only problem found in the SWRTA case for ED3 was that there was a generator at bus 14010 offline. Tom stated this was the only generator in the case, so it was manually put online so a fault current output could be obtained. Don stated that he would put the generators online in the future.

c) Cases Checked after Initial Revisions

Tom stated that since the last meeting, NPC had corrected the problems that prevented the comparisons as well as other revisions and sent the case back for a second round of checking. Tom stated that WAPA had revised their case by putting in the bus numbers needed for fault comparisons and sent their case back for a second round of checking. Tom stated that both of these cases had gone through a second round of error checking, but the same errors remained in the WAPA case because only the bus numbers had been changed.

Tom stated that for the NPC case, there were 3 branches in the pre case with the same ID as shown in the pre1r1.rep file. Tom stated there was 1 transformer with a secondary voltage difference more than 20 as shown in the r1log1 file. As an action item, Ron and Tom will look into this problem and determine what the message means and what the problem is. Tom stated there was 1 three winding transformer with test voltage outside +/-15% as shown in the r1log1 file. Tom stated there were 12 duplicate transformer circuit as shown in the r1log1 file. Tom stated that Ron was waiting for an explanation from Electrocon on this problem. Tom stated that there were 14 transformer neutral nodes added as shown in the r1log1 file. Tom stated these were not a problem because they were simply grounding impedances. Tom stated there were 665 of 668 lines added as shown in the log1 file.

Tom stated there were invalid characters in 211 line names as shown in the r1log2 file. Tom stated that Ron was waiting for a list of acceptable characters from Electrocon. Tom stated there were 45 transformer test warnings as shown in the r1log2 file. Tom stated most of these were simply autotransformers with a delta tertiary, but there were some other warnings which may be problems. Tom stated there were 17 transformers with winding kV different from base kV as shown in the r1log2 file. Tom stated NPC may want to look at these to see if they are correct. Tom stated there was a phase angle loop at 1 bus as shown in the r1log2 file. Tom stated that NPC may want to look at this to see if one of their transformers was incorrectly connected. Tom stated there was a singularity detected at 12 buses as shown in the r1log2 file. Tom stated that NPC may want to look at these to make sure the equipment that is offline is supposed to be offline. Tom stated there were 42 isolated buses in the positive sequence network. Tom stated that NPC may want to look at these to make sure the equipment that is offline is supposed to be offline.

d) Fault Current Comparisons

Tom stated that prior to the second round of error checking, Ron and Tom checked the fault current comparisons. Tom stated that they found that the switch reactance setting in Aspen during the fault generation in the initial round of error checking had not been set to the minimum of 0.00001. Tom stated that the Aspen default of 0.001 had been used for the switch reactance in all of the fault currents generated in the initial round of error checking. Tom stated that the switch reactance was set to 0.00001 in Aspen and all the faults were rerun for all of the cases. Tom stated that all of the new fault currents had been put in all of the spreadsheets. Tom stated that the WAPA case had changed all of the buses with a number of 0 to unique numbers and the faults were rerun in both Cape and

Aspen for the comparison. Tom stated that the same technique previously presented for changing the areas and zones in the July meeting was used to change the bus numbers. Tom stated that he found the numbers that WAPA used in WECC and added numbers not used by WECC that were above the last WAPA number. Tom stated that the SWRTA, SWTC, and SRP cases had several buses with a number of 0. Tom stated that he manually changed the spreadsheets to have numbers that matched the numbers that Cape generated for these buses so good comparisons could be made. Tom stated that some of the other cases with bus numbers of 0 had too many to manually change.

Tom stated that for the APS case, there were 313 buses with a difference of 100 A or more between the pre and post Aspen cases. Tom stated that this indicated that something was changed during the conversion process. As an action item, Ron and Tom will look at what changed during the conversion process to give these differences. Tom stated that there were 317 buses with a difference of 100 A or more between the pre and Cape cases. Tom stated this appeared to indicate that the majority of the problems were due to the initial conversion from Aspen to Cape. Tom stated there were 57 buses with a 100 A or more difference between Cape and the post Aspen cases. Tom stated that there were 40 buses with a 100 A or more difference between Cape and the post Aspen cases for 3 phase faults. Tom stated there were 20 buses with a 100 A or more difference between Cape and the post Aspen case for the SLG fault. Tom stated that this appeared to indicate that the problem was not just a zero sequence problem like those found in the DPV2 case used for the PTI to Aspen conversion checks.

Tom stated that for the EPE case, there were 209 buses with a bus number of 0. Tom stated that there were too many buses to manually change, so the pre and post as well as the pre and Cape comparisons were not useful. Tom stated that there were 7 buses with a difference of 100 A or more between the Cape and post Aspen cases. Tom stated that there was only 1 difference greater than 100 A for the SLG fault. Tom stated that this also appeared to indicate that the problem was not just a zero sequence problem.

Tom stated that for the NPC case, there were only 12 of 633 buses that had a bus number. As an action item, Alex stated that he would get Kevin S. to add bus numbers to the case. As an action item, Tom stated that he would show Alex the buses spreadsheet after the meeting and the methodology used for bus numbers. Tom stated that there were too many buses to manually change, so the pre and post as well as the pre and Cape comparisons were not useful. Tom stated that there were 68 buses with a difference of 100 A or more between the Cape and post Aspen cases. Tom stated that there were 39 buses with a 100 A or more difference between the Cape and post Aspen case for 3 phase faults. Tom stated there were 38 buses with a 100 A or more difference between the Cape and post Aspen cases for the SLG fault. Tom stated that this indicated that there were some zero sequence problems.

Tom stated that for the SRP case, there were 15 buses with a number of 0. Tom stated that he manually changed these in the spreadsheet, but not in the case. Tom stated that there were 12 buses with a 100 A or more difference between the pre and post Aspen cases. Tom stated that there were 134 buses with 100 A or more difference between the

pre and Cape cases. Tom stated there were 123 buses with 100 A or more difference between the Cape and post Aspen cases. Tom stated that the majority of the problems appear to be in differences between Cape and Aspen calculations. As an action item, Ron and Tom will rerun these faults after the meeting and look at the differences if they are the same to find out why there were differences between the Aspen and Cape calculations.

Tom stated that for the SWRTA case, there was 1 of 25 buses that had a number. Tom stated that he manually changed these in the spreadsheet to get a comparison. Tom stated that there were no buses with a 1 amp or greater difference between the pre and post Aspen cases. Tom stated there with 9 buses with a 0 A or more difference between the pre and Cape cases. Tom stated that 4 amps was the highest difference. Tom stated there were 9 buses with a 0 A or more difference between the Cape and post Aspen cases. Tom stated that 4 A was the highest difference. Tom stated the majority of the differences appear to be in the conversion from Aspen to Cape. Tom stated that this actually looks like the differences are due to the different calculation methods in Cape and Aspen. Tom stated that even though the differences were small, for a larger system the differences could be larger.

Tom stated that for the SWTC case, there were 62 buses with a number of 0. Tom stated that there were too many buses to manually change, so the pre and post as well as the pre and Cape comparisons were not useful. Tom stated that there were 6 buses with a difference of 100 A or more between the Cape and post Aspen cases.

Tom stated that for the TEP case, it was not possible to generate the post faults because of the errors reading the file. Tom stated that the TEP case had 570 buses with a bus number of 0. Tom stated that there were too many buses to manually change, so there was no pre and Cape comparison made. Tom stated that a comparison would be made when TEP corrects the problems that prevented reading the post case.

Tom stated that the WAPA case was revised to have unique bus numbers for all of the buses. Tom stated that there were 22 buses with 100 A or more difference between the pre and post Aspen cases. Tom stated that there were 25 buses with 100 A or more difference between the pre and Cape cases. Tom stated there were 133 buses with 100 A or more difference between Cape and the post Aspen cases. Tom stated that the majority of the problems appear to be in conversion from Cape to Aspen. As an action item, Ron and Tom will look at the differences in the Cape and post results to find out what the differences are due to. Tom stated there were 93 buses with 100 A or more difference between the Cape and post Aspen cases for 3 phase faults. Tom stated there were 59 buses with 100 A or more difference between the Cape and post Aspen cases for SLG faults. Tom stated that this showed there were some zero sequence problems, but most were other problems.

4) **WestConnect Map Work Proposal**

The WestConnect Map Proposal agenda item was covered next. Tom stated that SWRTA had responded to the clarification request from SWAT. Tom handed out SWRTA clarification letter which is attached to the end of these meeting minutes. Tom stated that there was a Westconnect meeting held on September 21, 2006. Tom stated that the map proposal was presented to WestConnect at this meeting and WestConnect requested additional information. Tom stated that he wanted to formulate a group response at this meeting to the questions that WestConnect had.

Tom stated that Rob K. had sent an email on September 22 with 5 questions that SWAT wanted the SWAT SCWG to clarify for WestConnect. Tom stated that the responses to the questions were requested by October. Tom stated that he had responded to Rob's email on September 25 and stated that the SWAT SCWG would develop the responses to the questions at this meeting.

Tom showed the September 22 email from Rob. Tom stated that he would like to address each of the five questions separately.

Tom stated that question 1 asked what was included. Tom handed out a copy of the map proposal. Tom asked the group if the map proposal was sufficient for what was included. Tom asked the group if they should give a bullet list of items for the response. Everyone agreed that the proposal covered everything that was included. Everyone agreed that a bullet item list should be provided. The group decided that the response should be:

The following is included:

- A common set of impedance maps based on the consolidated case
- This proposal is only for the 2007 case maps
- 1 copy of the impedance maps in black and white D size
- 1 copy of the impedance maps in black and white 11"x17" size
- 1 CD for each SWAT SCWG member with drawings in editable AutoCad format

Tom stated that question 2 asked if this was a one time funding request or if there will be ongoing costs. Tom stated that the proposal calls for drawings in editable format. Tom asked the group if the group will make future updates or if they should include them in the proposal. Tom stated that Robs' email wanted the costs to be kept to a minimum. Everyone agreed that future updates would be determined in the future. The group decided that the response should be:

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

Tom stated that question 3 asked if we have a funding limit. Tom stated that the email from Rob presented at the July 2006 meeting said that anything over $30k would need to be discussed. Tom stated that our estimates were over $30k. Tom asked the group what the response to this question should be. The group decided that the response should be:

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

Tom stated that question 4 asked how we are coordinating with CCPG and does the SWAT initiative fit with CCPG. Tom stated that the CCPG liaison had been sent teleconference information on the meetings, but last participated in the March 2006 meeting. Tom stated that a liaison had been formed with CCPG, but no report on CCPG activities had been provided by the CCPG liaison yet. Tom stated that the group had obtained information on the CCPG group from a member of the CCPG group in an unofficial capacity. Tom stated that he did not want to be negative in his response, but the group had mainly had a 1 way communication so far with CCPG and did not know much about what CCPG was doing. Tom stated that CCPG does not post much information about what the group does on their website, so he did not know what to do about this beyond what the group had already done. Tom stated that CCPG wanted to use Aspen oneline maps instead of the impedance maps. Tom stated that there was information on the impedance maps that is not on the Aspen maps. Tom stated that the group had discussions with the CCPG liaison about combining the cases, but there was no information beyond that. Tom asked the group what they should say and what they should do about the lack of information from CCPG. There was a lot of discussion about how to word the response. The group finally decided that the response should be:

The CCPG short circuit database group has been sent teleconference information and is on the SWAT SCWG mailing list. The SWAT SCWG has appointed Steve Conrad as their liaison with the CCPG short circuit database group. The SWAT SCWG has discussed combining their case with the CCPG short circuit database group.

Tom stated that question 5 asked if we are coordinating with others and how does it fit. Tom stated that we may or may not form a task force for the EN-SCSG which will include others in STEP and NTAC. Tom stated that the group created a presentation that was presented to STEP which showed the benefits of STEP forming a SCWG and recommended that STEP form a SCWG. Tom stated that STEP had not formed a SCWG and there was a reorganization going on within CAISO related to STEP. Tom stated the group had contacted STEP and NTAC for the EN-SCSG in preparation for them forming a group. Tom stated that the group had contacted SCE and SDGE for IID issues with access to material and that CFE had become involved in these discussions. Tom stated that it appears that SDGE, SCE, and CFE will be combining their cases independent of STEP as an initial California initiative to improve their short circuit data. Tom asked the group who they should be coordinating with beyond the adjacent groups and utilities. Everyone agreed that the group was working with the groups and utilities that they should be coordinating with. Tom stated that the group would be equivalencing out others areas in the impedance maps beyond the boundary of SWAT, so how should the group respond to “how does it fit”? The group decided that the response should be:

The SWAT SCWG is working with the California utilities to develop a case that the SWAT SCWG would combine their case with. This would eliminate the need for equivalents on the SWAT western boundary.

5) Areas and Zones in Cases

The Areas and Zones in Cases agenda item was covered next. Tom stated that a response was needed from all of the members for the zone they want to use for their mutuals, the zone they want to use for their equivalents, the zone they want to use for their seams buses, and the full rang of zones they want to use for their data. Tom showed the area and zone spreadsheet on the website. Tom stated that he had responses from several members on the full range of zones they want to use. Tom stated that some of the members had added their zones to their cases. Tom stated that the columns for equivalents, mutual, and seams bus zones had been added. Tom stated that the group has to finish filling this sheet with their zones before the cases can be combined. Tom stated this has to be done before any member can finish their case because they will need the information on the other members' seams zones to put in their cases.

Tom stated that the each member should be preparing their cases for combining their cases. Tom stated that he wanted to go over the plan again so everyone will see where we are and what we have to do. Tom stated this will show why everyone needs to finish deciding which zones they need before the group can move on.

Tom stated that in the plan, the group has to finish error checking the individual cases first. Tom stated that this will help to solve the problems in the members' data before they are combined. Tom stated it will be easier for each member to fix their own problems in a smaller case than in the combined case. He stated that the work on the error checking was making progress. Tom stated that there were other things that had to be done by Electrocon before all the fixes could be made. Tom stated that the next step is to develop common methods for equivalencing. Tom stated that there had not been much work done on this yet. Tom stated that since Ron is the only person with Cape and he is busy with the error checking, this probably won't proceed far until the error checking is finished. Tom stated that a parallel step with error checking is for everyone to place the areas and zones in their cases. Tom stated that this can be done as soon as everyone provides their zone information. Tom stated that a parallel step with error checking is for everyone to use the same bus numbers for their seams buses. Tom stated that the bus sheet was on the website, but everyone has to enter the bus names and numbers they want to use for their seams buses before the other members can put these in their cases. Tom stated that when these steps were finished, the cases can be combined two at a time. Tom stated that the zones and seams buses have to be in the cases before they can be combined.

Tom stated that for combining the cases, each combination will require stripping out the zones for a member which include their range of zones including their mutuals, their equivalents, and all seams zones in their case. Tom stated that the seams zones can be exported or made visible to easily make sure that the combining connected everything correctly. Tom stated that this will be one of the hardest parts of the combining, but if the seams buses are all setup correctly, they should combine without problems. Tom stated that the mutual zones will also have to be in the cases to eliminate elements from one of

the members' cases when two lines from different companies have mutual coupling. Tom stated this will have to be done prior to the combining. Tom stated that the mutual zones will have to be shown for each case and when there is coupling between the data in the two cases being combined, the elements in one of the cases coupled to will have to be eliminated. Tom stated that some members may not have the coupling on the lines, so the lines not coupled will have to be removed from one case before the combining. Tom stated that the mutual zones will also have to be in the cases so they can be exported for generating the impedance maps later which have separate sheets for the mutual coupling. Tom stated that the equivalent zones will be extracted when the SWAT SCWG case is combined with other study group cases and replaced with the exact representations. Tom stated that the equivalent zones will have to be in the case so this can be easily done.

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.

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

Tom stated that Alex F. had given a presentation on the East Nevada Short Circuit Study Group (EN-SCSG) at the August 2006 meeting. Tom stated that a draft scope document from the group had been distributed to the SWAT SCWG members on August 25. Tom handed out a copy of the draft scope document which is attached to the end of these minutes. Tom stated that he had placed the EN-SCSG presentation given at the August SWAT SCWG meeting on the website. Tom stated that he had also placed a website link to the EN-SCSG on the website, but the EN-SCSG did not have their website up yet. Tom stated that the SWAT SCWG decided at their August meeting to have a vote on whether or not they should form a task force to participate in the EN-SCSG at this meeting. Tom stated that presentations had been given to the Northwest Power Pool (NWPP), STEP, and MPP (Mead Phoenix Project) by the EN-SCSG. Tom stated that an EN-SCSG presentation was scheduled for WATS. Tom stated that he would like to discuss the draft scope of the EN-SCSG and the presentation that the EN-SCSG had given to NWPP, STEP, and MPP before having a vote on forming the task force.

Tom showed the Introduction in the scope document and stated that it summarizes the projects in the NPC/SPPC plan. Tom stated that it shows that there are violations at Mead, but did not identify others' substations. Tom stated that some members may be affected in the area, but many members will not be affected by the NPC additions. Tom showed the scope part of the document and stated that the scope does not address other members' additions, but others may want their additions placed in the same case to study the total planned impacts which would be helpful for the members to plan for breaker replacements. Alex F. stated that other members' additions could be added to the case to study all of the impacts. Tom stated that he had some concerns about the cost sharing aspects of the group and would like to limit participation to the technical analysis. Tom stated that he would discuss this at the first EN-SCSG meeting. Tom stated that the

SWAT SCWG case is scheduled to be completed by the summer of 2007, so any modifications for the EN-SCSG would have to be made after that.

Tom showed the first 2 slides of the EN-SCSG presentations. He stated that the first slide shows the projects that NPC/SPPC will be putting in through 2014. Tom stated that the reason for the group showed that preliminary studies identified potential short circuit impacts on breaker duties at McCullough substation, but the impacts on other stations are not known. Tom stated that some of the members' substations may also be impacted by these additions. Tom said that the slide also stated that a more detailed case would be needed to evaluate all impacts. Tom stated that the SWAT SCWG may want to equivalence out part of their case and just put in a sufficient representation for the substations in SWAT that may be affected.

Tom showed the next slide which stated that the group plan was to solicit membership from utilities in the affected areas, build a case to analyze the impacts of the NEVP/SPPC development plans, perform analysis of the impacts, and generate a report with results and recommendations. Tom stated that the case would have to have Southern California and part of Utah in it to look at all of the utilities that may be affected. Alex stated that the utilities in those areas that were concerned had been contacted and some would be participating.

Tom showed the next slide which stated that the base case would be developed first, all planned additions by time frame would be added in separate cases, equivalents would be used for utilities not participating, and the cases would be converted to Cape, PTI, and Aspen formats. Tom stated that some of the SWAT SCWG members may want their cases equivalenced out as well. Tom stated that the time frames could be used for SWAT SCWG members planned additions. Tom stated that the base case would have to be the current case. Alex stated that the plan was to have the task forces build the base case using current data so it would not be a difficult task. Tom stated that this may be a good step in getting a California combined case and a Utah combined case since neither area has any formalized short circuit working group at this point in time.

Tom showed the next slide which stated that 3 task forces would be formed in the EN-SCSG which would consist of NTAC, SWAT, and California. The slide stated that the choice of the program to use would be up to each task force and that task forces would develop 3 cases in parallel. Tom stated that this should be an easy step for the SWAT SCWG since they are already developing a combined case. Tom stated that the slide showed that there would be error checking of each case. Tom stated that this is similar to the approach the SWAT SCWG is taking of each member having their cases error checked before combining. Tom stated that since the SWAT SCWG case would be finished by the summer of 2007, there should not be any errors in the SWAT SCWG case. Tom stated that this should be an easy step for the SWAT SCWG. Tom stated that the slide shows that the cases would be combined after the task forces complete their work. Tom stated this would be the only time consuming part for the SWAT SCWG task force because there would be duplicate bus numbers between the cases, possibly duplicate names, and possibly duplicate zones. Tom stated that as long as the EN-SCSG

uses WECC bus numbers and zones when there is a conflict, there should not be much of a problem for the SWAT SCWG task force.

Tom showed the next slide which stated that the impacts of the individual projects would be studied and the short circuit levels at all participating members' stations would be identified. Tom showed that the slide stated that breaker duty analysis would be performed for all participating members with stations they want to be studied. Tom stated this is an important statement because the preliminary studies performed by NEVP/SPPC probably did not include many breakers at SWAT SCWG members' stations because they probably do not know the breaker information necessary for a proper breaker duty study. Alex stated that they performed analysis for the stations that they felt would be affected, but they do not have detailed information on all breakers on the system. Tom stated that when the breaker duty studies are performed, they may identify other breakers that NEVP/SPPC has not identified because of the lack of data. Tom stated that the breaker duty evaluations would have to have some common methodologies developed that would be similar to those developed by the SWAT SCWG to be acceptable to the members. Alex stated that the breaker duty evaluation methods used would have to be acceptable to everyone in the EN-SCSG. Tom showed that the slide stated that alternative mitigation methods would be evaluated.

Tom showed the last slide which stated that the report would present all short circuit levels by phases, present all breaker duty evaluations, and recommend over-duty equipment replacement by time frame.

Tom stated that before the group votes, he wanted to discuss some of the issues. Tom stated that if the SWAT SCWG provides their case to the EN-SCSG, there would have to be a reciprocity from those in the EN-SCSG for their cases. Tom stated that if a member of the SWAT SCWG is not interested in participating, they should be given the option of equivalencing out their part of the system in the case. Tom stated that the SWAT SCWG would have to have the option of altering their case to just the part that the SWAT SCWG members want before giving it to the EN-SCSG. Tom stated that the SWAT SCWG would want the option to put any additions they are planning through 2014 added to the cases developed by the EN-SCSG. Tom asked if there were any other issues that anyone wanted discussed. It was stated that there would also have to be a non-disclosure agreement between the members for their cases. There were no other issues brought up.

Tom stated that the initial presentation and scope should have been reviewed by each member with their company, the presentation given to NWPP, STEP, and MPP had been discussed, and our concerns had been discussed. Tom stated that he would like to have a vote at this time if there were no other issues to be discussed. Tom asked everyone if they wanted to form a task force to participate in the EN-SCSG. Everyone agreed that the SWAT SCWG should form a task force to participate in the EN-SCSG in a unanimous vote.

Tom stated that since the SWAT SCWG decided to form a task force, they would have to determine who would chair the task force, who the members would be, and if the task

force will meet in conjunction with the SCWG meeting. As an action item, Tom F. will send out an email asking each member if they want to be on the task force and if they would like to chair the task force. Tom stated that the task force will determine their meeting schedule later.

8) Determine Location of Next Meeting

The last agenda item, Determine Location of Next Meeting, was covered next. Tom stated that Steve C. had requested meeting on Tuesdays instead of on Thursdays. Tom stated that the Phoenix IEEE meetings are on the 3rd Thursday of each month which was brought up as a problem at the August meeting. Tom stated that holidays in November and December causing problems was brought up at the last meeting. Tom stated that NPC volunteered to host the meeting in Las Vegas on October 26. Tom stated that end of year projects may make meeting schedules difficult for some people.

Tom asked if the group would like to return to meeting on the 3rd Thursday of each month and have the next meeting on the 3rd Thursday in November or possibly the 3rd Tuesday in November. Maria R. stated that we should remain on the monthly meeting schedule and continue meeting on a monthly schedule. Others felt that the next meeting should be held in October. Tom asked if we should have it on Thursday or on Tuesday. Those that voiced an opinion stated that it should be on Thursday. Tom asked if everyone wanted to have the next meeting on October 26 in Las Vegas. Everyone agreed that the next meeting should be held on October 26 in Las Vegas. Tom asked if the group should meet from 9:30 am to 4:00 pm. Everyone agreed that the meeting should be scheduled from 9:30 am to 4 pm.

As an action item, Tom F. will send out the agenda for the next meeting with the directions and information provided by NPC/SPPC. Tom 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

September 28, 2006
9:00AM to 2:15PM Mountain Time
Location: El Paso Electric Company
Conference Room 4E, Centre Building
123 W. Mills
El Paso, TX 79960

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. **Determine Location of Next Meeting**

East Nevada Short Circuit Study Group Meeting will be held after the SWAT SCWG meeting from 2:15 to 3:15 pm.

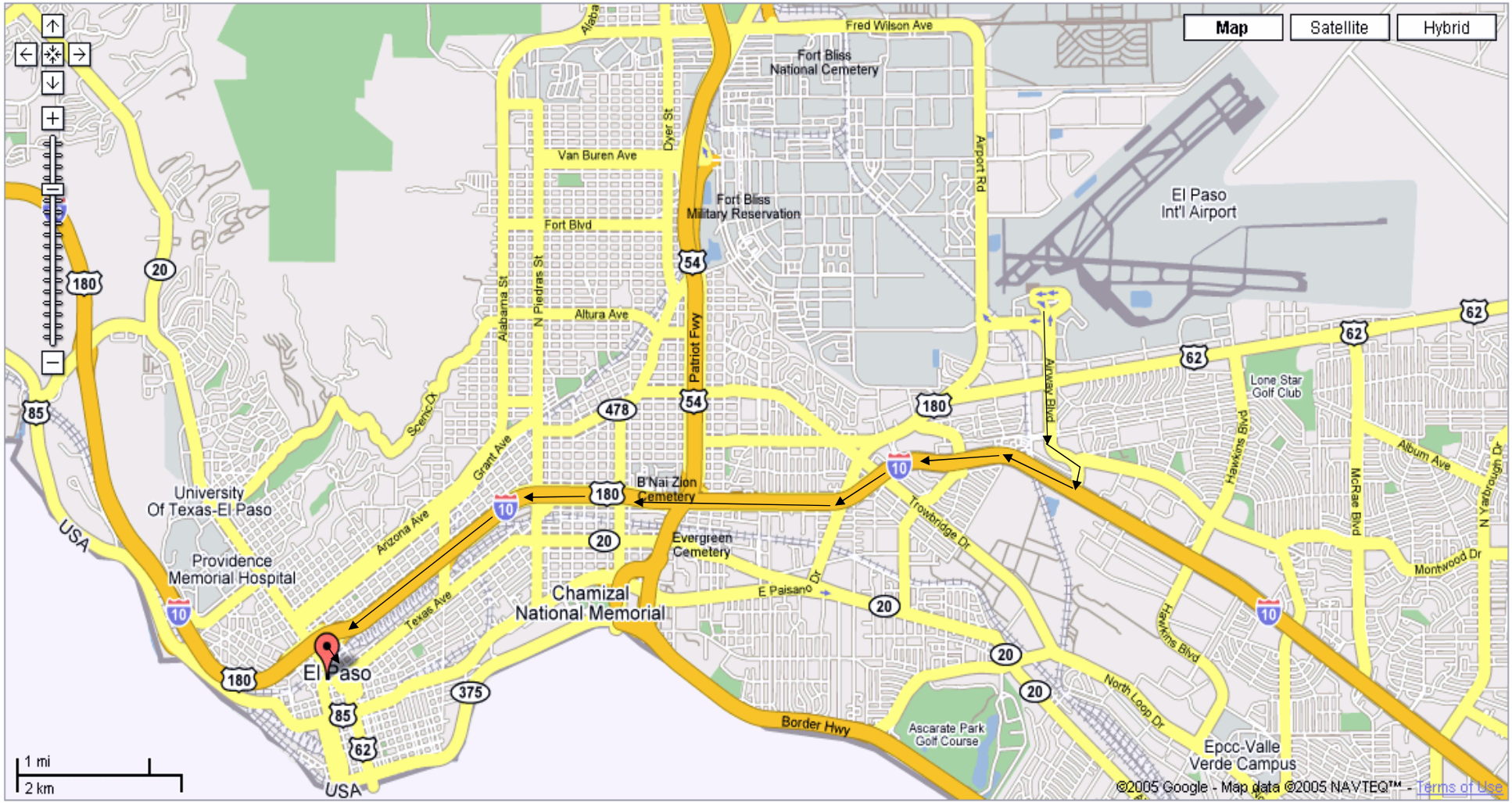
Meeting Location Instructions:

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

Call (915) 820-5546 if you get lost

Please see attached map for directions from airport.

DIRECTIONS TO EL PASO ELECTRIC COMPANY'S CENTRE BUILDING
(123 W. MILLS)



1. From the Airport, take Airway Blvd south to I-10 West (≈ 2 miles).
2. Stay on I-10 W for about 5 miles.
3. Take the Dowtown/Convention Center (Exit 19B). This exit becomes Missouri St.
4. Stay on Missouri and go past 4 stop lights until you reach Oregon St. (Oregon is a one-way street heading south).
5. Turn left on Oregon. After you pass the first stop light (Franklin), park in the parking garage on the right side of the street (just before Main St and next to Jack-In-The Box).
6. This is a valet parking garage, so wait for the attendant to give you a ticket. This ticket will be validated at the EPE Centre building.
7. From the parking garage, walk south 1 block past Main St. and turn right on Mills St.
8. The Centre building (123 W. Mills) is the second building (white building) on the right side, just before the Plaza Theater.
9. You will need to check in with the security guard located right in front of the elevators.

SWAT SC Working Group

September 28, 2006
9:00AM to 2:15 PM
Location: El Paso Electric Company
Conference Room 4E
123 W. Mills
El Paso, TX

Name	Company	Phone	Email
CLAUDIA DENEEN	EPE	(915) 543-5903	cdeneen1@epelectric.com
JOHN EVANS (guest)	SNWA	(702) 862-3475	JOHN.EVANS@SNWA.COM
DON ADAMS	KRSA	(480) 610-8741	dca@krsaline.com
JORGE L. BARRIENTOS	IID	(760) 482-3443	jlbarrientos@iid.com
David Gutierrez	EPE	(915) 543-4083	dgutierr@epelectric.com
MARIA RAMIREZ	SRP	602 236 0217	mdramire@srpnet.com
David Wheeler	SRP	602-236-0987	DEWheele@srpnet.com
Alex Fratkin	SPR	775-834-4897	afratkin@spp.com
Thomas Field	WAPA	(602)-605-2517	field@wapa.gov
Kevin Salsbury (teleconference)	NPC	(702) 657-4022	ksalsbury@nevp.com
Ron Onate (teleconference)	APS	(602) 371-7754	ronald.onate@aps.com

SC2G
SWRTA Class 2 Group

SC2G MEMBERS

Aguila Irrigation District

Ak-Chin Electric Utility Authority

Buckeye Water Conservation and Drainage District

Electrical District No. 2 of Pinal County

Electrical District No. 3 of Pinal County

Electrical District No. 4 of Pinal County

Electrical District No. 5 of Pinal County

Electrical District No. 6 of Pinal County

Electrical District No. 7 of Maricopa County

Electrical District No. 8 of Maricopa County

City of Safford

Harquahala Valley Power District

Maricopa County Municipal Water Conservation District No. 1

McMullen Valley Water Conservation & Drainage District

Roosevelt Irrigation District

San Carlos Irrigation Project

Tonopah Irrigation District

Town of Thatcher

Town of Wickenburg

Wellton-Mohawk Irrigation and Drainage District

Dennis L. Delaney, P.E.
WECC Member Representative

160 N. Pasadena, Suite 101
Mesa, Arizona 85201-6767

Phone: 480.610.8747
Fax: 480.610.8796
Cellular: 602.321.9086
Email: dld@krsaline.com

August 22, 2006

VIA E-MAIL

Tom Field
Electric Engineer
Western Area Power Administration

Don Adams asked that I respond to your August 21, 2006 e-mail regarding SWRTA clarification. When the Southwest Regional Transmission Association ("SWRTA") merged with Western Systems Coordinating Council and Western Regional Transmission Association to form the Western Electricity Coordinating Council ("WECC") in April of 2002, approximately 20 of the existing SWRTA Class 2 Members jointly filed for WECC membership as an informal group using the name SWRTA Class 2 Group. The members of SWRTA Class 2 Group ("SC2G") are listed on the left margin of this memo.

You asked for some information on the SWRTA organization that exists today. SWRTA as a formal organization disbanded after the merger. My office maintains the historical SWRTA archives. I do not recall the exact date SWRTA terminated as an organization but I believe it was in the 2003-2004 time period.

The SC2G members were active supporters and members of SWRTA for more than a decade and chose to retain the SWRTA acronym when they joined WECC. As members of WECC, the members of SC2G participate in several regional planning forums (STEP, CATS, SWAT, Western's JPA, etc.) sometimes individually, sometimes as a subset of the entire group and at times as a group.

We hope this clears up any remaining questions or concerns regarding these issues. If not please call me to discuss the remaining concerns.

Eastern Nevada Short Circuit Study Group

INTRODUCTION

Nevada Power Company (NEVP) and Sierra Pacific Power Company (SPPC) have submitted the Eastern Nevada Development Plan to the NPUC as a part of the NEVP 2006 IRP. The plan can be seen in Figure 1. This plan includes 3100 MW of new generation, more than 700 miles of new 500 kV transmission lines, more than 100 miles of new and upgraded 230-138 kV lines, new substations: two 500/230 kV, one 500/345 kV, and 6 to 10 230/138/69 kV with total transformation capacity of more than 7000 MVA. A preliminary evaluation of the expected fault duties showed a number of breaker duty violations on the NEVP system as well as at Mead and McCullough substations. In order to study the impacts of the project on breakers, NEVP and SPPC are setting up a Short Circuit Study Group (SCSG) to develop a short circuit case with the best information on the adjacent systems which could be impacted by the NEVP, evaluate the breaker duties on these systems, and develop a report to document its findings.

EASTERN NEVADA SHORT CIRCUIT STUDY GROUP SCOPE

The Eastern Nevada Short Circuit Study Group (SCSG) will hold monthly meetings to develop a Short Circuit Case which will include all of the Eastern Nevada Development Plan projects through the year 2014. This study group will solicit participation from all of the adjacent systems and any other transmission providers in the WECC area interested in participating. This study group will evaluate the levels of short circuit currents after the project implementation and respective contributions of the new facilities. This evaluation will be performed based on the contributions of the major development phases and participants of the project. The evaluation results will be used to recommend circuit breaker upgrades and/or other short circuit current limiting measures. The contributions from the projects to the necessary short circuit mitigation equipment will be evaluated to assist in the cost sharing procedures for the required network upgrades. The group will develop a final report that will document the procedures used to develop the case, the project phases used in the case, the methodology used to evaluate the short circuit duty of breakers, the short circuit mitigation alternatives studied, the methodology used to determine the cost sharing, and all of the data applied to these methods as well as the results. The Eastern Nevada SCSG work is anticipated to take 1 year for completion from the date of the first meeting.

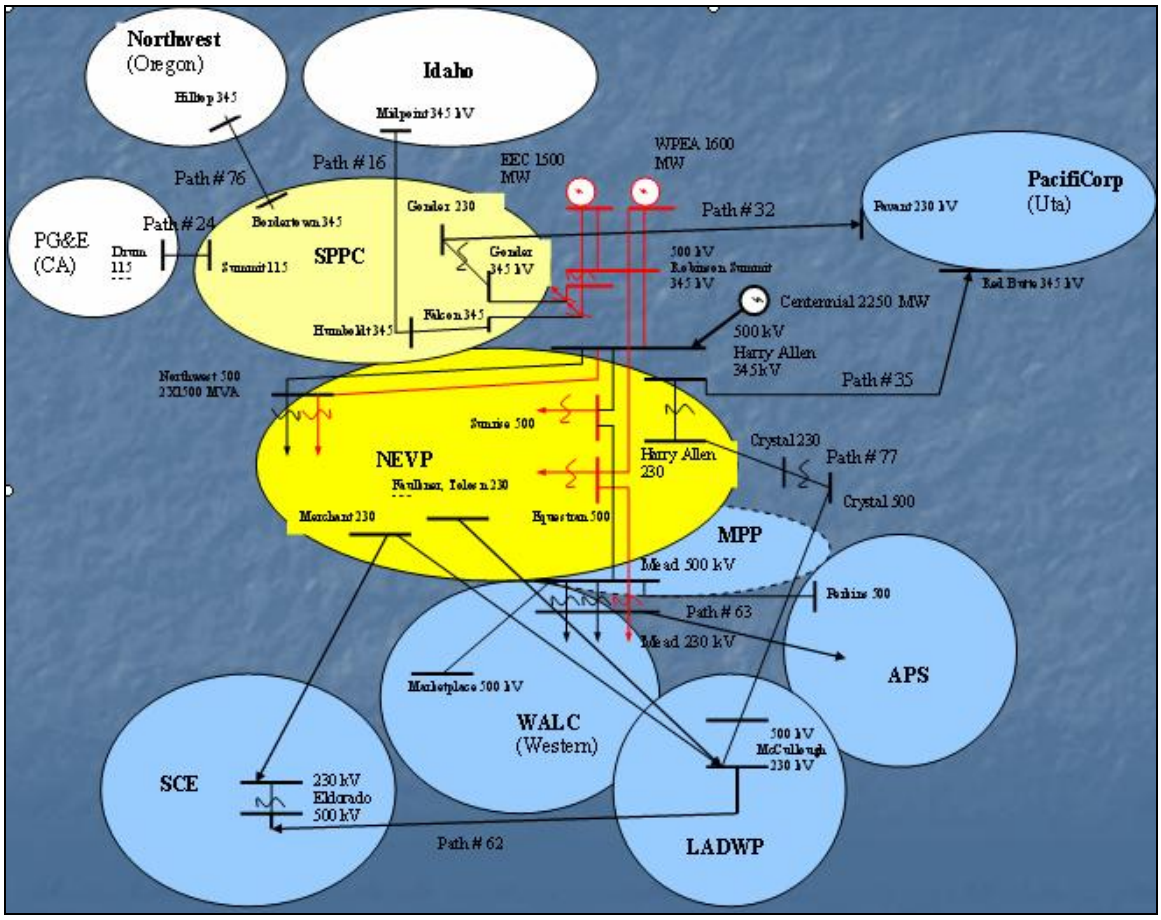


FIGURE 1
EASTERN NEVADA PROJECT: MAJOR FACILITIES AND TIES

PARTICIPATION IN THE EASTERN NEVADA SHORT CIRCUIT STUDY GROUP

The Eastern Nevada Short Circuit Study Group will operate in coordination with the SWAT SCWG and other regional Short Circuit groups (affiliated with STEP, NTAC, CAISO, etc.). The initial meeting of the Eastern Nevada SCSG will be held in El Paso, Texas on September 28. 2006. If you interested in participating, please contact Alex Fratkin of SPPC/NEVP:

E-mail: AFratkin@sppc.com
Phone: 775-834-4897
Please provide your contact information as follows:
Name: _____
Company: _____
E-mail: _____
Phone: _____

SWAT SCWG

September 28, 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**
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. **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 (unapproved)
September 2006 Agenda (draft 3)

Update on August Meeting Action Items

- **Person:** Tom Field
- **Action Item:** Change the July meeting minutes to include the action item for everyone to put the areas and zones in their cases.

- **Person:** Tom Field
- **Action Item:** Place the July meeting minutes on the website as approved after adding the areas and zones action item.

- **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.

Update on August Meeting Action Items

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

- **Person:** Tom Field
- **Action Item:** Contact Steve C. and ask him to report on the IEEE PSRC meeting in September.

- **Person:** Tom Field
- **Action Item:** Contact Mike A. and ask him to report on the IEEE PSRC meeting in September.

IEEE PSRC members

- Email sent on August 23 requesting list of members
- 2006 membership list attached
- No responses
- Should we place link to groups related to SC applications?

Links for Groups

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

Links

IEEE Switchgear Committee
IEEE Power System Relay Committee
WECC Relay Working Group

Update on August Meeting Action Items

- **Person:** Robert Sanders
- **Action Item:** Send in the IID impedance maps to place on the website.

- **Person:** Tom Field
- **Action Item:** Discuss the access of material on the website further with IID after the meeting. Call Robert S. on August 18 to discuss the access to the material further.

- **Person:** Don Adams
- **Action Item:** Check with Dennis and let Tom F. know if the SWRTA contact information on the website should be changed.

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

- **Person:** Maria Ramirez, Ron Onate, and Tom Field
- **Action Item:** Check the conversions for all .dxt cases and generate the warning files and comparison spreadsheets which will be sent back to the case owners and posted on the website.

Update on August Meeting Action Items

- **Person:** Ron Onate
- **Action Item:** Call Electrocon and have them work out the DDD transformer problem with Aspen.

- **Person:** Tom Field
- **Action Item:** Call Aspen and have them work out the DDD transformer problem with Electrocon.

- **Person:** Ron Onate
- **Action Item:** Check the DDD transformers in the SRP case to see if they were phase shifters after the meeting.

Update on August Meeting Action Items

- **Person:** Ron Onate
- **Action Item:** Get the information on the transformer tests in the standards and send it to Tom F. to put in the July meeting minutes as an attachment.

- **Person:** Ron Onate
- **Action Item:** Look at the transformer test connection changes in the cases.

- **Person:** Ron Onate and Tom Field
- **Action Item:** Have a teleconference with Aspen and Electrocon if Ron finds the transformer test connections to be a problem and have them get the problem resolved.

Update on August Meeting Action Items

- **Person:** Tom Field
- **Action Item:** Check the pre and post .dxt files for the EPE cases and determine whether or not the transformers had been changed or if these were just warning messages.

- **Person:** Ron Onate and Tom Field
- **Action Item:** Look at the transformers with root 3 removal converted from DDY to DDD problem in cases and call Electrocon

- **Person:** Ron Onate
- **Action Item:** Find out why17 transformers with winding kV different from the base kV in the NPC case were not listed.

Update on August 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:** Check the SRP case again with the ignore prefault setting in the SC preference and determine if this will eliminate the winding voltage different from base kV error messages.

- **Person:** Ron Onate
- **Action Item:** Look into why the 2 neutral buses in the EPE case were added.

Update on August Meeting Action Items

- **Person:** Ron Onate
- **Action Item:** 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.

- **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 at the next meeting.

Update on August Meeting Action Items

- **Person:** Ron Onate
- **Action Item:** Rerun the NPC case and see if there was another log file created with more details which was referenced in the singularity warning.

- **Person:** Ron Onate
- **Action Item:** Find why 1 of the switches was not added in the APS case.

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

Update on August Meeting Action Items

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

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

Update on August Meeting Action Items

- **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.

- **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:** Ron Onate and Tom Field
- **Action Item:** Get together and rerun the faults to get the settings the same for matching the cases in a comparison.

Update on August Meeting Action Items

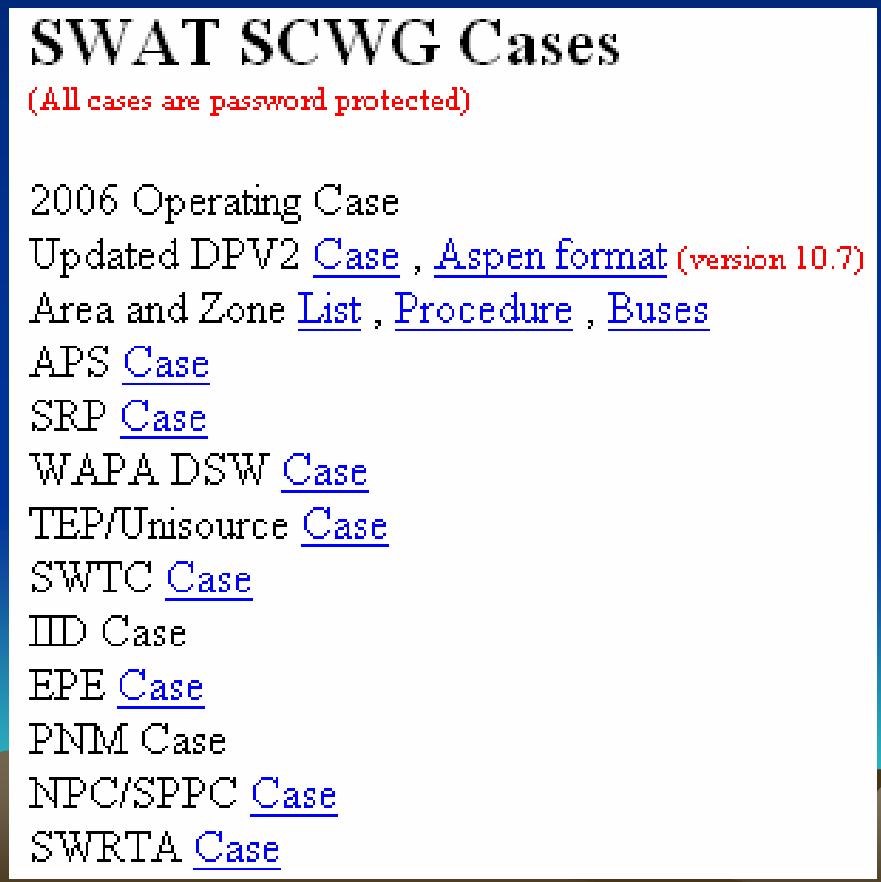
- **Person:** Entire Group
- **Action Item:** Add unique bus numbers to your buses that have a bus number of 0 and send in your case for the second round of error checking to be able to determine the number of buses with a difference of 100 A or more.

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

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

Update on August Meeting Action Items

- **Person:** Tom Field
- **Action Item:** Point out at the next meeting who has responded with the .dxt cases as well as the area and zone information and who hasn't.



SWAT SCWG Cases

(All cases are password protected)

2006 Operating Case
Updated DPV2 Case , Aspen format (version 10.7)
Area and Zone List , Procedure , Buses
APS Case
SRP Case
WAPA DSW Case
TEP/Unisource Case
SWTC Case
IID Case
EPE Case
PNM Case
NPC/SPPC Case
SWRTA Case

Update on August Meeting Action Items

- **Person:** Entire Group
- **Action Item:** If you are an owner of a seams bus and want different information than in the WECC case, send your information to Tom F. to change in the buses spreadsheet.

- **Person:** Entire Group
- **Action Item:** Review your seams buses that you are the owner 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 you want to use for them.

Update on August 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:** Change the buses spreadsheet to include any split bus information that members send in.

- **Person:** Tom Field
- **Action Item:** Setup a column in the area and zone spreadsheet for the mutual zone, the equivalent zone, and the seams zone for everyone.

Update on August Meeting Action Items

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

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

Update on August Meeting Action Items

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

- **Person:** Tom Field
- **Action Item:** Attach the equivalents user group handout to the June 2006 meeting minutes and place it on the website.

- **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.

Reclosing Questions

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 (unapproved)
September 2006 Agenda (draft 2)

Other Meeting Material

May 2006 STEP SCWG Presentation
May 2006 SWAT Steering Committee SCWG Update
EPRI Task Force 37 Spring 2006 Breaker Presentation
July 2006 JPA Presentation and Speech
July 2006 WAPA Safety Ground Tables Tutorial, Handout, Speech
August 2006 SWAT Steering Committee SCWG Update
August 2006 Reclosing Practices Survey

Reclosing Questions

- 2 responses

1. What is the formula being used to calculate the open intervals on your reclosers?
    a. If no formula is being used…what criteria are being used to determine the intervals?
2. Do you have multiple reclosing on 69 kV and higher?
    a. If so, which voltages? (particularly 69kV, 115 kV, 230 kV and 345 kV)
    b. What are the criteria to justify more than one reclose?
    c. What open intervals do you use for each reclosing criteria?
3. How often do you test the line before patrolling (after unsuccessful reclosing)…
    a. On lines with multiple reclosing?
    b. On lines with a single reclose?
    c. Do you differentiate between voltages 69 kV and above when determining how many times to test the line?
4. Do you have lines that have no reclosing?
    a. If yes, what criteria do you use to determine this?
5. Do you lockout on substation bus faults 25 kV and lower?
    a. If no, do you test the bus before sending someone to the site?
6. Do you use synch relays for reclosing on 69 kV and higher?
    a. If yes, do you use a standard angle difference setting? Or do you use a setting from planning studies?
    b. Do you also use voltage checking?
        i. If so, what are your criteria?
7. Do you have any criteria on through-fault limitation of transformers? For example do you limit reclosing on breakers on either side of critical transformers?
8. Do you allow reclosing on lines feeding out of power plants?
    a. If not…do you reclose on he remote ends of these lines?
    b. Do you test from the remote end only?
9. Do you limit or disallow reclosing on particular type of faults? (i.e. 3LG, 1LG, etc.)
10. Who is the contact at your company for reclosing practices…,
    a. from a system protection perspective?
    b. from an operations perspective?

Update on August Meeting Action Items

- **Person:** Alex Fratkin
- **Action Item:** Submit a scope document to the SWAT SCWG prior to the next SWAT SCWG meeting which would include the time line for the group, the methodology to be used for the study, and what is expected to be accomplished.

- **Person:** Tom Field
- **Action Item:** Send the Eastern Nevada SCSG scope to the members for discussion with their management prior to the next meeting after receiving it from Alex.

- **Person:** Tom Field
- **Action Item:** Place the Eastern Nevada SCSG presentation in the meeting minutes.

Update on August Meeting Action Items

- **Person:** Tom Field
- **Action Item:** Place the Eastern Nevada SCSG presentation next to a dead link for the Eastern Nevada SCSG until they have an active webpage.

- **Person:** Alex Fratkin
- **Action Item:** Contact Tom F. before the next meeting and either give Tom the link for the webpage or ask Tom to setup a webpage for him.

Eastern Nevada SCSG link

SWAT SCWG Task Forces

East Nevada Short Circuit Study Group (SCSG) Link (webpage not active yet)
SWAT SCWG Task Force Members on East Nevada SCSG (task force not setup yet)
August 17, 2006 Initial East Nevada SCSG Presentation

Update on August Meeting Action Items

- **Person:** Entire Group
- **Action Item:** Discuss the Eastern Nevada SCSG proposal with your company and determine if they want the group to form a task force and if they want you to be a member of a task force or have someone different on it.

- **Person:** Entire Group
- **Action Item:** Be prepared for a vote at the next meeting on forming a task force to participate in the Eastern Nevada SCSG.

- **Person:** Tom Field
- **Action Item:** Get the NTAC, STEP, and CAISO contact information for Alex and suggested that he also present his proposal at the next SWAT meeting.

Update on August Meeting Action Items

- **Person:** Tom Field
- **Action Item:** Ask Dave G. for a 1 hour time slot for the Eastern Nevada SCSG to have their meeting.

- **Person:** Tom Field
- **Action Item:** Check the flight schedules and arrange the September time such that everyone can make it there and back in one day.

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

Additional Action Items

- Any other action Items not in draft Minutes?

New Items

- WestConnect Meeting held on September 21, 2006
- WestConnect requested additional information for Map Proposal

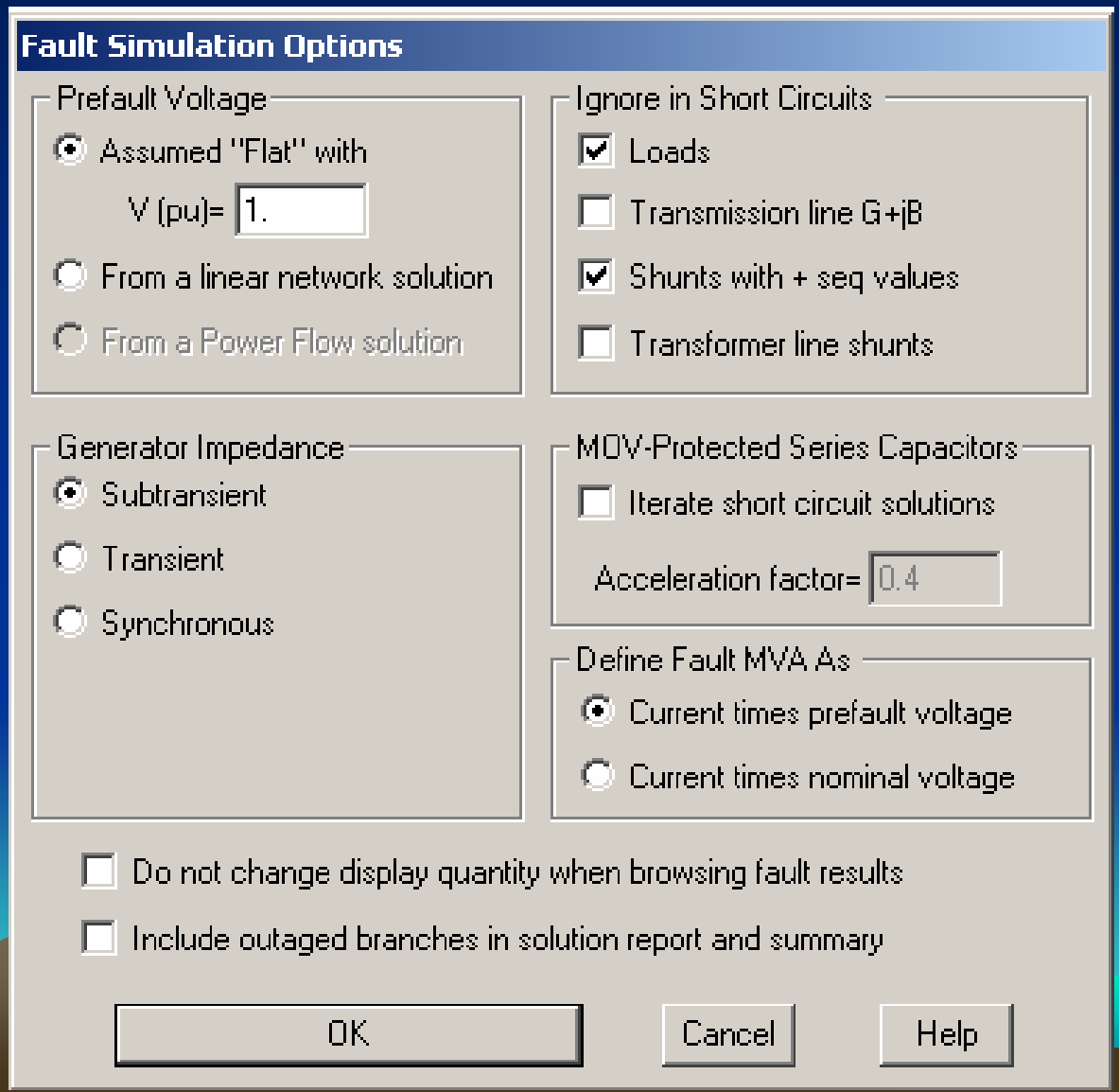
Other New Items

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

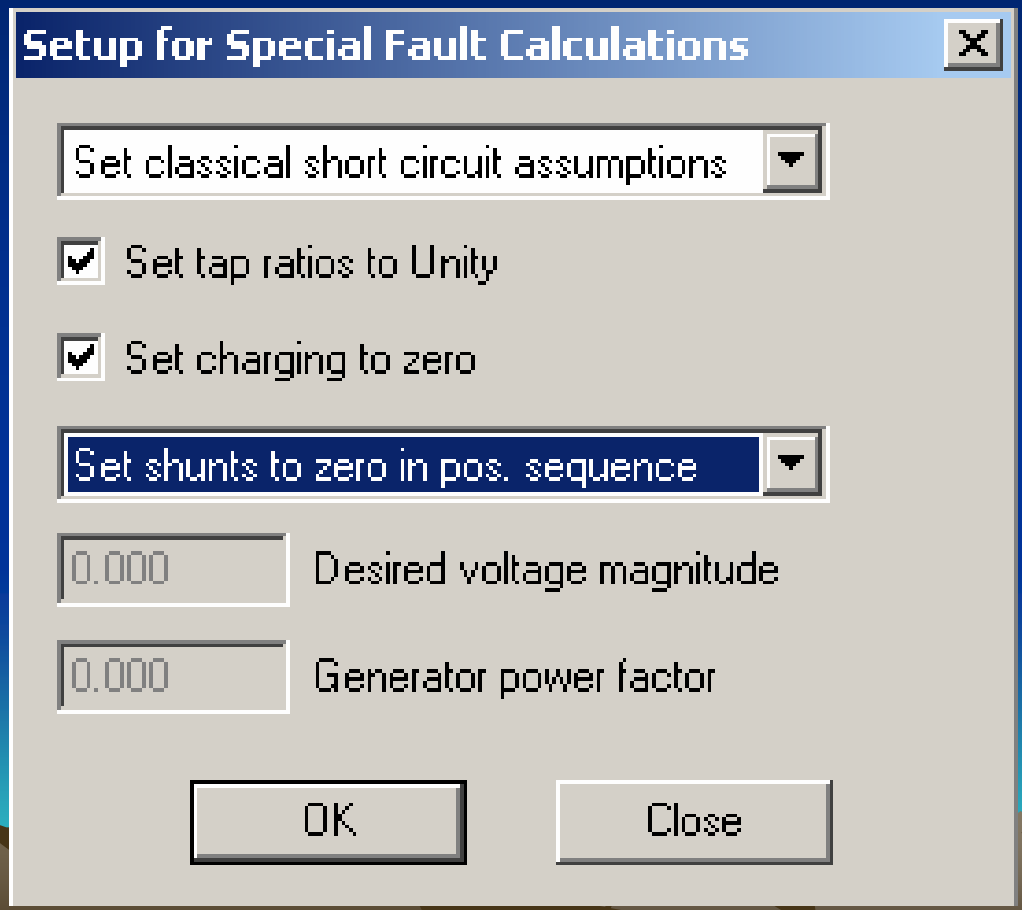
PTI to Aspen Conversions

- Aspen change for transformer problem checked
- Zero Impedance line differences needs to be worked on with PTI and Aspen

Aspen Program Change for Transformers



PTI Settings



Results

- 134 Buses with 100 A or greater difference
- Buses with 100 A or greater difference not analyzed yet to determine which ones are not an issue and what the cause of remaining ones are yet
- Zero impedance line differences not worked out yet

Check of Members Cases

- 2 of previous 5 cases analyzed sent in with revisions for second round of checking
- 4 additional cases sent in to be checked for first time
- Only 1 member has not submitted their case to be checked
- Ron and Tom met for 2 full days in September completing action items, checking revised cases, and checking new cases
- Issues to be resolved for Cape sent to Electrocon on September 21
- Tom reran all comparisons after settings refinement was found (some with zero bus numbers were manually altered to get a comparison)
- Tom placed new comparison files, revised error files, and new case files on website

Action Item details – DDD transformer

- Call Electrocon and have them work out the DDD transformer problem with Aspen.
- The DDD transformer in the DPV2 case was incorrectly input and should not have been DDD
- There are no DDD transformers in the members cases
- Because we have no DDD transformers, this issue was dropped

Action Items – DDD Transformer

- Check the DDD transformers in the SRP case to see if they were phase shifters after the meeting.
- The DDD was a DD for connections and a D for test connections in 2 winding transformers

Action Items – Transformer Tests

- Look at the transformers with root 3 removal converted from DDY to DDD problem in cases and call Cape
- Found that Cape removes root of 3 in conversion to give matching results.
- Found Cape converts back to Aspen as DDD which gives root 3 difference
- Total difference going back to Cape is 3 from root 3 removal and Y to D test connection change

Action Items – Transformer Tests

- Log1 file – cape conversion from Aspen

```
... found 140 2-winding transformers
        3 had root(3) removal
        3 converted from DDY to DDD
```

Action Items – Transformer Tests

- Jeff with Electrocon agreed to fix problem in Cape on September 15

6) Have you found a solution for the transformer test connection we discussed last Friday?

Ron,

Daryl sent an email Friday with answers to some of these questions. We have only decided that we would fix #6, not how.

Transformer Tests

Your question 6 concerned Aspen data for a two-winding transformer tested as Wye-Wye(G) but connected as Delta-Delta (DD). Your report showed that importing data from Aspen and exporting the same data back to ASPEN reduces the fault current computed by ASPEN by a factor of 3 from 40193.1 to 13536.3.

We have reproduced the CAPE results from your data.

We have modified the CAPE database so that it can record a delta-delta transformer tested as "G" (grounded wye). Then CAPE will has enough information to export the Y Y G connection and the correct line-line voltages. These changes will be in the next CAPE release.

We are only treating the two-winding transformers at this stage, since all the three-winding transformers in your example are wye-wye-delta. However if you expect any difficulties exporting data from CAPE with two or three deltas, please let me know and we will change the three-winding transformers separately.

Transformer Tests

At present, you obtain the correct fault currents from CAPE by running iAspentoDB.exe as at present. To fix the data file exported from CAPE to ASPEN it appears that you have to do the following, but the ASPEN manual does not explain the details.

Find the original "D D G" transformers.

For these transformers only:

Multiply the exported transformer voltages by sqrt(3) in the Aspen data file

Specify the connections as D D G instead of D D D in the exported file.

Transformer Tests

For example, the exported record from CAPE to ASPEN is now

'RGD GEN6' 13.8 'rgd 4160' 4.16 '1'= 1 0 'RGD-6 Sta' /
13.8 4.16 0 0 0.0053 0 0 0.0053 0 /
D D D 0 0 0 0 0 0 1 3 0 0 0.51 1.5 0.00625 0.51 1.5 " 0

The original record is

'RGD GEN6' 13.8 'rgd 4160' 4.16 '1'= 1 0 'RGD-6 Sta' /
23.9023 7.20533 0 0 0.0053 0 0 0.0053 0 /
D D G 0 0 0 0 0 0 0 3 3 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

The other differences in these records are not significant.

I suggest that you test this procedure by running ASPEN with the file exported from CAPE. Compare the computed fault currents for these two cases. Please will you let me know the results, since we do not have ASPEN available at Electrocon.

Action Items – Transformer Tests

- Get the information on the transformer tests in the standards and send it to Tom F. to put in the July meeting minutes as an attachment.
- IEEE C57.12-1999 pages 31 and 32
- Zero sequence impedance test connections

Action Items – Transformer Warning Messages

- Check the pre and post .dxt files for the EPE cases and determine whether or not the transformers had been changed or if these were just warning messages.
- Found that Cape gives a warning message on all 3 winding auto-transformers with delta tertiary
- Results do not appear to be affected

Action Items – Transformer Warning Messages

- Log1 file – cape conversion from Aspen

```
Area 11 EPE
     warning: XFMR_144 delta CLOSED but + seq and 0 seq XFMR tests equal; OPEN expected; check
     NCKT XFMR "145 NEWMAN"  to  "144 NEWMAN" Ckt 5
```

Action Items – Transformer Warning Messages

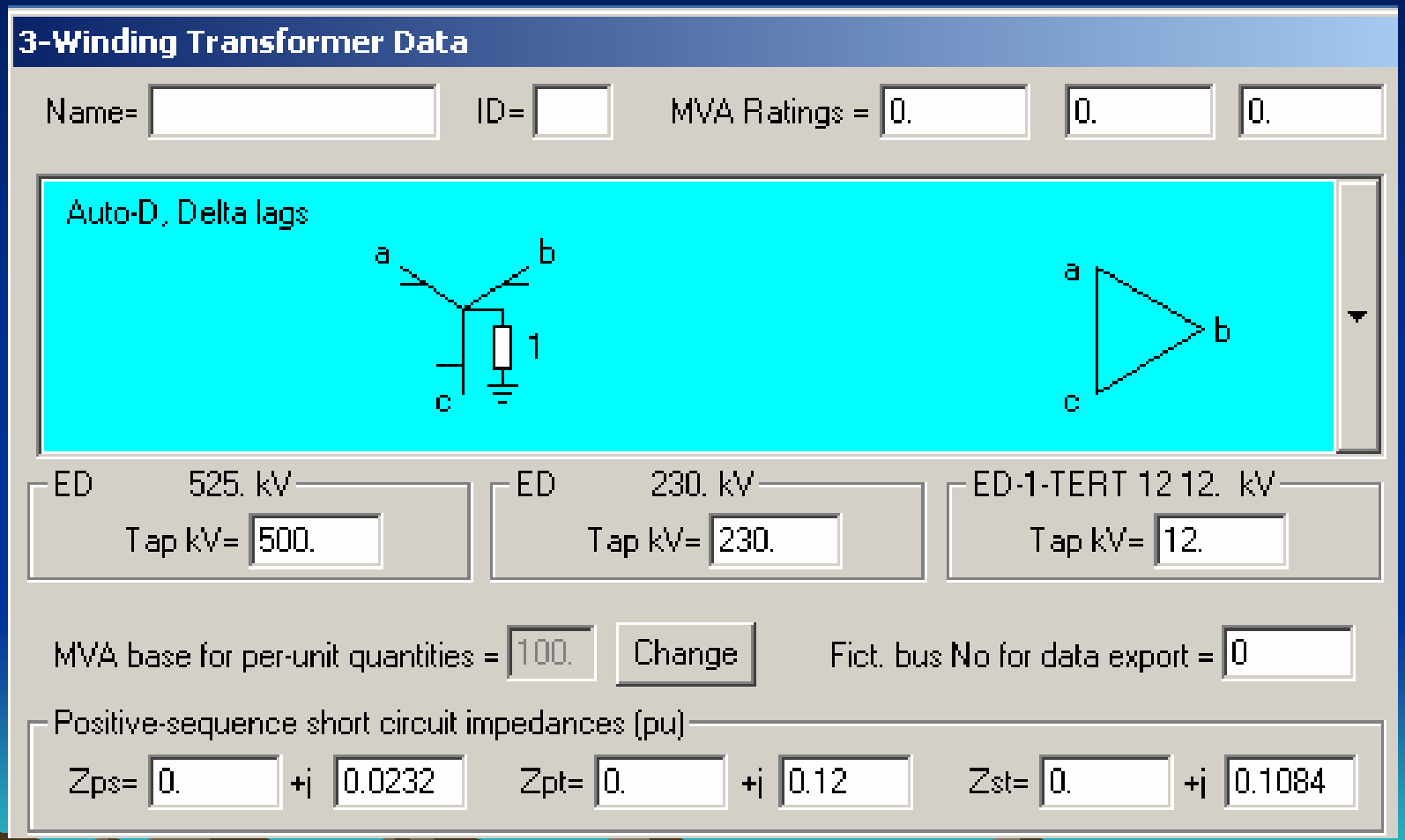
- Electrocon asked to explain why these warning messages are generated

5) On 3-wdg auto-transformers with a delta tertiary we found that a warning message is generated as shown in the attached file, epe_log.bmp. This appears to be generated for all autos in Aspen. Does this affect the short circuit solution? Are these messages necessary if they don't affect the short circuit results?

Action Items – Transformer Base kV different from Winding kV

- Find out why17 transformers with winding kV different from the base kV in the NPC case were not listed.
- Found that Cape gives a warning message on all transformers that have a tap set other than base voltage
- Results do not appear to be affected
- Example is 525 kV base set on 500 kV tap

Action Items – Transformer Base kV different from Winding kV



Action Items – Transformer Base kV different from Winding kV

- Check the SRP case again with the ignore prefault setting in the SC preference and determine if this will eliminate the winding voltage different from base kV error messages.
- No option in Cape to ignore the prefault voltage.
- The only prefault ignore option is for prefault current mismatch
- The set voltage profile off by setting voltage multiple to 1.0 option to remove prefault solution appears to have no affect on short circuit solutions in Cape

Action Items – Transformer Base kV different from Winding kV

- Cape asked if this only has affect on load flow solution

2) When there is a difference in tap voltage vs. base voltage in transformers, Cape issues a warning for this difference. Why does it issue the warning when there is no difference in the short circuit solution when you use "voltage profile" or "voltage multiplier" in the setup ? Does it have anything to do with the load flow module?

Transformer Base kV different from Winding kV

Your question 2 concerned warnings about off-nominal transformer taps. The off-nominal fixed-tap ratio for a transformer winding is defined as

Ratio = (Nominal transformer winding kV used in measurements)/
(Bus base kV in network)

If you set Use Fixed Taps ON, CAPE reports ratios over 120% or less than 80% in order to warn the user of a possible data error. If your transformer buses are correct, you should ignore the messages. If the voltage profile is flat or does not match the tap ratio, CAPE will also report large prefault mismatch currents in the windings.

If you set Use_Fixed_Taps OFF or use the "Classical" Short-Circuit solution, CAPE uses the bus base kV in place of the transformer winding kV and uses the test impedances exactly as given, without the warnings. The approximations are that the transformer turns ratio equals the ratio of network voltage bases and that the perunit impedance is independent of the fixed tap.

Transformer Base kV different from Winding kV

Example

```
Area 100 AREA_100
    Warning:   tap   345.33 kV; base   230.00 kV; difference > 20 % at
bus 1 in H
     ( Line 78 )  transformer #   1
Area 100 AREA_100
    Warning:   tap   345.33 kV; base   230.00 kV; difference > 20 % at
bus 1 in H
     ( Line 82 )  transformer #   2
 2 N-circuit transformers
```

Action Items – Transformer Neutral Grounding

- Look into why the 2 neutral buses in the EPE case were added.
- Found that Cape adds a bus when a neutral grounding impedance is used
- Neutral Grounding impedance is turned into a separate transformer shunt in Cape connected to a separate bus
- Cape does not tell what transformer this bus is connected to
- No problems found in the solutions from this change
- Neutral impedance added back to the transformer when converted back to Aspen

Action Items – Transformer Neutral Grounding

- Log1 file – cape conversion from Aspen

```
... found 2 neutral buses
... found 2 neutral shunts
... found 0 neutral branches
```

- Cape transformer reference numbers given, but no relation to Aspen numbers

```
working on xfmr 534 126 0
 YD  nonauto; Z1 (0.050000, 0.000000) represents shunt at P
```

Action Items – Transformer Neutral Grounding

- Electrocon asked to identify transformers with neutral grounding by substation or bus number

4) In conversion of transformers with grounding impedances, a neutral node is added. In the log file would it be possible to identify the substation or transformer bus number where this bus is added?

Action Items – Duplicate Circuit Warnings

- 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.
- Not sure why the duplicate messages were identified
- Some messages for duplicate line and transformer and others for just transformers

Action Items – Duplicate Circuit Warnings

- Cape numbers referenced are internal to Cape and do not correlate to Aspen

```
duplicate line/xfmr ckt at 245 145
 line 245 is in area 8
 xfmr 145 is in area 8
 common = 2
 wdg1 = 756 757 0
 wdg2 = 754 757 756
duplicate line/xfmr ckt at 466 2
 line 466 is in area 2
 xfmr 2 is in area 2
 common = 2
 wdg1 = 1056 1049 0
 wdg2 = 1049 1056 0
duplicate xfmr/xfmr ckt at 4 111
 xfmr 4 is in area 3
 xfmr 111 is in area 3
 common = 2
 wdg1 = 623 202 0
 wdg2 = 623 202 255
duplicate xfmr/xfmr ckt at 32 167
 xfmr 32 is in area 7
 xfmr 167 is in area 3
 common = 2
 wdg1 = 210 622 0
 wdg2 = 622 210 1077
```

Action Items – Duplicate Circuit Warnings

- Electrocon asked to explain these messages

> 3) In the attached file, srp_log.bmp, there are some duplicate line/xfmr and xfmr/xfmr with numbers after "ckt at" which do not correlate to bus numbers or equipment numbers. We cannot find these elements to determine why this message is generated. Could you please tell us what these numbers are, why lines are compared to transformers, and why are these messages generated? Also will this affect the short circuit solutions?

Action Items – Cape Name Characters

- Develop a list of what characters are not accepted in Cape.

- Talk to Electrocon about changing the program to accept other characters in the member's names and report on it at the next meeting.

1) In naming lines, buses, transformers, etc., Cape does not appear to allow many characters other than underscores. Do you have a list of characters that are accepted by Cape? Would it be possible to allow other characters? Many Aspen cases use spaces , dashes, slashes, # signs. Would it be possible to modify Cape to accept these other characters in Aspen names?

Action Items – Log Data for Singularities

- Rerun the NPC case and see if there was another log file created with more details which was referenced in the singularity warning.
- Full log file found to contain details
- Log1 file with full details on website

Action Items – Log Data for Singularities

- NPC log1 file from 2nd round of checking

Singularity detected at the following buses:

Group	Area	Number	Name	BasekV	Substation
1	4	792	VEN-1	25.0	Unassigned
1	4	793	VEN-2	25.0	Unassigned
1	1	794	VEN-B1	25.0	Unassigned
1	1	795	VEN-B2	25.0	Unassigned
2	5	566	PP-2A TAP 2	69.0	Unassigned
3	5	83	BMI-T	69.0	Unassigned
4	5	42	AWT-T2	69.0	Unassigned
5	5	683	SO-T1	69.0	Unassigned
6	5	71	BL-T1	69.0	Unassigned
7	10	64	BGB Bk2	25.0	Unassigned
8	4	498	NPS-T1 4	4.0	Unassigned
9	10	656	SIN	12.0	Unassigned

All buses in ungrounded groups:

Group	Area	Number	Name	BasekV	Substation
1	4	792	VEN-1	25.0	Unassigned
1	4	793	VEN-2	25.0	Unassigned
1	1	794	VEN-B1	25.0	Unassigned
1	1	795	VEN-B2	25.0	Unassigned
2	5	560	PP-1 2	69.0	Unassigned
2	5	562	PP-1A 2	69.0	Unassigned
2	5	564	PP-2A 2	69.0	Unassigned
2	5	566	PP-2A TAP 2	69.0	Unassigned
3	5	83	BMI-T	69.0	Unassigned

Action Items – Switch Messages

- Find why 1 of the switches was not added in the APS case.

New Cases Checked

- TEP Case checked
- SWTC Case checked
- SWRTA Case checked

TEP Case Problems

- 4 two winding transformers had root 3 removal and ddy to ddd test connection changes – log1
- 15 neutral buses and 15 shunts added – log1
- 1 duplicate line/xfmr ckt
- 2 generators are offline – log1
- 9 switch names changed – log2
- 9 warnings that end buses not found on bus ties – log2
- 186 line names changed – log2
- 133 transformer names changed – log2
- 37 transformers with winding kV/base kV differences – log2
- 4 mutual couplings ignored because bus not found – log2
- 4 buses with singularities – log2

TEP Case Problems

- Error reading file for post generation – post1.rep
- one or both generator impedances are zero for one generator – post1.rep
- Illegal winding conf. in use of transformer – post1.rep

SWTC Case Problems

- 1 generator at bus 277 offline – log1
- 2 bus ties added – log1
- One line with name change – log2
- 2 groups of singularities in positive sequence – log2
- 8 groups of singularities in zero sequence – log2

SWRTA ED3 Case Problems

- 1 generator at bus 14010 offline – log1

Cases Checked after Initial Revisions

- NPC Case checked after revisions
- WAPA Case revisions only for bus numbers

NPC Case Problems

- 3 branches in pre case with same ID – pre1r1.rep
- 1 transformer with secondary voltage difference more than 20 – r1log1.txt
- 1 three winding transformer test voltage outside +/- 15% - r1log1.txt
- 12 duplicate transformer circuits – r1log1.txt
- 14 transformer neutral nodes added – r1log1.txt
- 665 of 668 lines added – r1log1.txt

NPC Case Problems

- Invalid characters in 211 line names – r1log2.txt
- Approximately 45 transformer test warnings – r1log2.txt
- 17 transformers with winding kV different from base kV – r1log2.txt
- Phase angle loop at 1 bus – r1log2.txt
- Singularity detected at 12 buses – r1log2.txt
- 42 isolated buses in positive sequence network - r1log2.txt

Fault Current Comparisons

- Problem initial checks found to be switch reactance setting in Aspen not at 0.00001
- All faults rerun in Aspen and put back in spreadsheets
- WAPA case changed bus number 0 to unique bus numbers and rerun in Cape and Aspen
- SWRTA, SWTC, and SRP buses with number 0 manually changed to match Cape for checks

APS Case – apscmp.xls

- 313 buses with 100 A or more difference between pre and post Aspen cases
- 317 buses with 100 A or more difference between pre and Cape cases
- 57 buses with 100 A or more difference between Cape and post Aspen cases
- Majority of problems appear to be in conversion from Aspen to Cape
- 40 buses with 100 A or more difference between Cape and post Aspen cases for 3 phase fault
- 22 buses with 100 A or more difference between Cape and post Aspen cases for SLG fault

EPE Case – epecmp.xls

- 209 buses with a bus number of 0
- Too many buses to manually change, so pre and post as well as pre and cape comparison not useful
- 7 buses with a difference of 100 A or more between Cape and post Aspen cases
- Only 1 difference greater than 100 A for SLG fault

NPC Case – npccmp.xls

- 12 of 633 buses had a bus number
- Too many buses to manually change, so pre and post as well as pre and cape comparison not useful
- 68 buses with a difference of 100 A or more between Cape and post Aspen cases
- 39 buses with 100 A or more difference between Cape and post Aspen cases for 3 phase fault
- 38 buses with 100 A or more difference between Cape and post Aspen cases for SLG fault

SRP Case – srpcmp.xls

- 15 buses with a bus number of 0
- Manually changed these to get a comparison
- 12 buses with 100 A or more difference between pre and post Aspen cases
- 134 buses with 100 A or more difference between pre and Cape cases
- 123 buses with 100 A or more difference between Cape and post Aspen cases
- Majority of problems appear to be in difference between Cape and Aspen calculations

SWRTA Case – swrtacmp.xls

- 1 of 25 buses had a bus number
- Manually changed these to get a comparison
- No buses with 1 A or more difference between pre and post Aspen cases
- 9 buses with 0 A or more difference between pre and Cape cases (4 A was highest difference)
- 9 buses with 0 A or more difference between Cape and post Aspen cases (4 A was highest difference)
- Majority of problems appear to be in conversion from Aspen to Cape

SWTC Case – swtccmp.xls

- 62 buses with a bus number of 0
- Too many buses to manually change, so pre and post as well as pre and cape comparison not useful
- 6 buses with a difference of 100 A or more between Cape and post Aspen cases

TEP Case

- Unable to generate post faults because of errors reading file
- 570 buses with a bus number of 0
- Too many buses to manually change, so pre and cape comparison not made

WAPA Case – wapacmp.xls

- All buses revised in case to have unique numbers
- 22 buses with 100 A or more difference between pre and post Aspen cases
- 25 buses with 100 A or more difference between pre and Cape cases
- 133 buses with 100 A or more difference between Cape and post Aspen cases
- Majority of problems appear to be in conversion from Cape to Aspen
- 93 buses with 100 A or more difference between Cape and post Aspen cases for 3 phase fault
- 59 buses with 100 A or more difference between Cape and post Aspen cases for SLG fault

WestConnect Map Proposal

- WestConnect Meeting held on September 21, 2006
- WestConnect requested additional information for Map Proposal

SWAT Cost Estimate

- Email on September 22 from Rob K.
- 5 questions asked for SWAT SCWG to clarify
- Responses requested by October
- Response to Rob K. on September 25 stated the SWAT SCWG would develop responses at this meeting

September 22 Email

The WC Steering committee supports the short circuit mapping initiative and has agreed in principle to support some level of funding. They would like to approve this at their November 1 meeting and would like input on the following:

1) Please provide more specifics on what is and what is not included
2) Is this a one-time funding request and SWAT will administer on-going costs or will there be on-going costs?
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?
4) How are we coordinating with CCPG and how does the SWAT initiative fit with the work of CCPG?
5) Are we coordinating with others? How does that fit?

We already addressed some of these items,… but would like our input on details before voting. I would add they will want to work with us on a reasonable spending limit.

Let's develop some responses for the WC Steering Committee during the next month in preparation for their next meeting.

Map Proposal Question 1

- Question: What is included?
- Is Map Proposal sufficient?
- Should we give a bullet list of items?

Map Proposal Question 2

- Question: Is this a one time funding request or will there be ongoing costs?
- The proposal calls for drawings in editable AutoCAD format
- Will we make future updates or include it here?
- Costs were requested to be kept to a minimum

Map Proposal Question 3

- Question: Do we have a funding limit?
- Previous email presented at July 2006 meeting said that anything over $30k would need to be discussed
- Our estimates were over $30k
- What is our response?

Map Proposal Question 4

- Question: How are we coordinating with CCPG and does SWAT initiative fit with CCPG?
- CCPG liaison sent teleconference information on meetings, but last participated in March 2006 meeting.
- Liaison formed with CCPG, but no report given
- Information obtained from member of CCPG in unofficial capacity
- CCPG wanted to use Aspen oneline map instead of impedance maps
- We had discussions with CCPG liaison about combining cases, but no information beyond that
- What do we say and what should we do?

Map Proposal Question 5

- Question: Are we coordinating with others and how does it fit?
- We may or may not form a task force for the EN-SCSG which will include others
- We have made presentations for STEP
- We have contacted STEP and NTAC for EN-SCSG in preparation for them forming group
- We have contacted SCE and SDGE for IID issues with access to material
- Who should we be coordinating with beyond adjacent groups and utilities?
- We would be equivalencing out others areas in the impedance maps, so how do we answer “how does it fit”?

Areas and Zones in Cases

- Responses needed from all members for mutual zone, equivalent zone, seams buses, and full zone range

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			

Review of Plan

- Finish error checking individual cases
- Develop common methods for equivalencing
- Everyone place areas and zones in cases
- Everyone use the same bus numbers for seams buses
- Combine cases 2 at a time

Review of Plan – combining cases

- Each combination requires stripping out the zones for a member which include their range, their mutuals, their equivalents, and their seams
- The seams zones can be exported or made visible to make sure the combining connected everything correctly
- The mutual zones will be exported for generating the impedance maps and eliminating elements from one of the members when two lines from different companies have mutual coupling.
- The mutual zones will also be exported for removing lines from one case that are coupled in another where there are different companies and one may not have used mutuals.
- The equivalent zones will be exported when our case is combined with another study groups case to add actual representations

Equivalents

- Any updates?

SWAT SCWG Task Force for East Nevada Short Circuit Study Group

- Presentation given at August 2006 meeting
- Draft Scope document distributed to members on August 25
- Presentation and website link placed on website
- Vote on forming task force at this meeting requested during August meeting
- Presentations given to NTAC, STEP, and MPP
- Presentation scheduled for WATS

EN-SCSG Draft Scope

Eastern Nevada Short Circuit Study Group

INTRODUCTION

Nevada Power Company (NEVP) and Sierra Pacific Power Company (SPPC) have submitted the Eastern Nevada Development Plan to the NPUC as a part of the NEVP 2006 IRP. The plan can be seen in Figure 1. This plan includes 3100 MW of new generation, more than 700 miles of new 500 kV transmission lines, more than 100 miles of new and upgraded 230-138 kV lines, new substations: two 500/230 kV, one 500/345 kV, and 6 to 10 230/138/69 kV with total transformation capacity of more than 7000 MVA. A preliminary evaluation of the expected fault duties showed a number of breaker duty violations on the NEVP system as well as at Mead and McCullough substations. In order to study the impacts of the project on breakers, NEVP and SPPC are setting up a Short Circuit Study Group (SCSG) to develop a short circuit case with the best information on the adjacent systems which could be impacted by the NEVP, evaluate the breaker duties on these systems, and develop a report to document its findings.

EN-SCSG Draft Scope

EASTERN NEVADA SHORT CIRCUIT STUDY GROUP SCOPE

The Eastern Nevada Short Circuit Study Group (SCSG) will hold monthly meetings to develop a Short Circuit Case which will include all of the Eastern Nevada Development Plan projects through the year 2014. This study group will solicit participation from all of the adjacent systems and any other transmission providers in the WECC area interested in participating. This study group will evaluate the levels of short circuit currents after the project implementation and respective contributions of the new facilities. This evaluation will be performed based on the contributions of the major development phases and participants of the project. The evaluation results will be used to recommend circuit breaker upgrades and/or other short circuit current limiting measures. The contributions from the projects to the necessary short circuit mitigation equipment will be evaluated to assist in the cost sharing procedures for the required network upgrades. The group will develop a final report that will document the procedures used to develop the case, the project phases used in the case, the methodology used to evaluate the short circuit duty of breakers, the short circuit mitigation alternatives studied, the methodology used to determine the cost sharing, and all of the data applied to these methods as well as the results. The Eastern Nevada SCSG work is anticipated to take 1 year for completion from the date of the first meeting.

EN-SCSG Presentations

2006 NEVP/SPPC IRP Transmission Plans through 2014 Include:

- 3100 MW of new generation
- More than 700 miles of new 500 kV Lines
- 3 new 500 kV substations
- 6 to 10 new 230 kV stations

Reason for Study Group

- Preliminary studies identified potential short circuit impacts on breaker duties at McCullough substation
- Breaker duties at other stations not known
- More detailed case needed to evaluate all impacts

EN-SCSG Presentations

Short Circuit Study Group Plan

- Solicit membership from utilities in affected areas
- Build case to analyze impacts of IRP
- Perform analysis of impacts
- Generate report with results and recommendations

EN-SCSG Presentations

Case Development

- Base case developed first
- All planned additions by time frame added in separate cases
- Equivalents used for utilities not participating
- Cases converted to CAPE, PTI, and Aspen formats

EN-SCSG Presentations

Base Case

- 3 Task Forces to be formed in SCSG
- NTAC, SWAT, and California
- Choice of program up to task force
- Develop in 3 cases in parallel
- Error checking of cases
- Combine cases after task forces complete work

EN-SCSG Presentations

Analysis

- Impacts of Individual Projects studied
- Short Circuit Levels at all participating members stations identified
- Breaker Duty Analysis performed for all participating members with stations they want studied
- Alternative mitigation methods evaluated

EN-SCSG Presentations

Report

- Present all short circuit levels by phases
- Present all breaker duty evaluations
- Recommend over-duty equipment replacement by time frame

Discussions and Vote

- If we provide our case, will there be a reciprocity from those in the EN-SCSG for their cases?
- If a member is not interested in participating, should we equivalence out their part of the system in the case?
- Would we alter our case for just what our members want before giving it to the EN-SCSG?
- Would we want any additions we are planning through 2014 added to the cases developed by the EN-SCSG?
- Do we want to form a task force to participate?

If Vote is Yes

- Who wants to chair the task force?
- Who wants to be a member?
- Will task force meet in conjunction with SCWG meeting?

Determine Location of Next Meeting

- Steve C. with PNM requested meeting on Tuesdays instead of Thursdays
- Phoenix IEEE meetings on 3rd Thursday of month brought up as problem in last meeting
- Holidays may cause schedule problems for November and December brought up at last meeting
-
- NPC volunteered to meet in Las Vegas on October 26
- End of year projects may make meeting schedules difficult for some

Website address

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