POWER SYSTEM RELAYING COMMITTEE
OF THE
IEEE POWER and ENERGY SOCIETY
MINUTES OF THE MEETING
September 13–16, 2010
Berkeley, CA
FINAL

Power System Relaying Committee
Main Committee Meeting Agenda
Sept. 16, 2010
Berkeley, CA
8:00 – 11:00 AM

I. Call to order / Introductions Miriam Sanders
II. Approval of Minutes/Financial Report Roger Hedding
III. Reports of Interest Miriam Sanders
A. Technical Paper Coordinator's Bob Pettigrew Report/Future Meetings
B. CIGRE Report M. Adamiak
C. IAS Power System Protection Committee Chuck Mozina
D. IEC Report Eric Udren
E. Standard Coordinator's Report Phil Winston
F. Substation Committee Report Craig Pruess
G. NERC Report
H. Other Reports of Interest

IEEE Conformity Assessment Program Alpesh Shah
IV. Advisory Committee Reports Miriam Sanders B1. Awards/ Recognition Oscar Bolado
V. Subcommittee Reports Miriam Sanders
C- System Protection Rich Hunt
I - Relaying Practices Bob Beresh
K - Substation Protection Pratap Mysore

H - Relaying Communications Veselin Skendzik
D - Line Protection Mike McDonald
J - Rotating Machinery Kevin Stephan
VI. Presentations Roger Hedding
Guide for Power System Protection Testing C11
Vahid Madani
Processes, Issues, Trends, and Quality Control in Relay Systems
Steve Kunsman

VII. Adjourn Miriam Sanders

I. Call to order / Introductions Sanders

Chairman Miriam Sanders called the meeting to order at 8:05 am.

II. Approval of Minutes (January Meeting) & Financial Report Hedding

The minutes of the Madison (May 2010) meeting were approved. We made a slight amount of money for the Madison meeting. Had to raise registration fees to cover the costs of Berkeley meeting. However, attendance was such that we covered our costs and then some.

III Chairman's Report Sanders

Meeting was called to order at 7:30 AM, Thursday September 16, 2010. After introductions, the main committee members were asked to stand and were counted. A quorum was met with a total of 72 present of our 130 members.

Time certainly flies when you are having fun. It's hard to believe that it has been almost two years that I have been chairman of the committee, and 8 years that I have been an officer of the PSRC. In the past two years we have seen some changes. We are now building a smart grid (like we weren't working on that already) thanks to the economic incentives and stimulus. The PSRC is generating more standards than ever with all the new challenges of the smart grid and the new technologies coming our way. The PSRC has seen more attendees then ever in the past two years, with this meeting at Berkeley being once again a record attendance. We have new meeting schedules with elongating the meeting time frame to eliminate conflicts - more tweaks to come in the near future. And sadly, we have seen the passing of some very good friends of the industry.

Bob Pettigrew as your incoming chairman has been great to work with and I'm positive you'll find the same thing. Hopefully I leave him with lots of opportunities and not too many challenges. He will take over a chairman in January 2011.

Roger Hedding I now dub our cookie monster. Since he had been planning our afternoon breaks, he has provided us with some wonderful cookies. It's amazing how quickly those disappear! Roger has been a real trooper in putting up with the new schedules and the grief that has brought with it. Hopefully folks are getting used to the new format.

We introduce Michael McDonald as the incoming secretary, starting in January 2011. Mike brings to us his strong leadership skills he honed as the Subcommittee chair D, the Line Protection SC. I'm sure he'll find this position more challenging and enlightening to the PSRC structure.

Also starting with the January meeting, we will have a new Standards Coordinator, Phil Winston. Jeff Gilbert has gone above and beyond normal duties with tackling this position for over 6 years. It is time we gave Jeff a break. I'm sure Phil will step up to the plate swinging.

The support of all the past chairs has been invaluable in my years as an officer. Thanks to all present during this meeting - Bob Dempsey, John Appleyard, Rick Taylor, George Nail, Tony Giuliante, Jack Chadwick, and Phil Winston. Particular thanks to Charlie Henville, my predecessor from whom I learned much. And of course thanks goes to all of the attendees for your support and patience.

It has been a great eight years since I started on this path. I hope to continue to participate in the PSRC and see us grow even more.

Reports of Interest

A. Technical Paper Coordinator's Report Pettigrew

1. PES General Meeting July 25-29, 2010 Minneapolis, MN

A total of 35 papers were approved for the 2010 PES General Meeting. A total of five sessions were scheduled for the 2010 GM.

- 3 PSRC Paper Sessions - 21 papers
- 2 PSRC Paper Forum Sessions - 14 papers

Thanks to Mike Dood, Roger Hedding, Mani Venkata, Alex Apostolov, and Ramakrishna Gokaraju for chairing these sessions
Author attendance at the Paper Sessions was quite good with 19 of 21 authors presenting.
Author attendance at the Paper Forum sessions was not so good with 7 of the 14 authors presenting. All "No Show" authors were reported to PES so the papers will be removed from the IEEE Xplore Digital Library.

2. Power Systems Conference and Exposition (PSCE) March 20-23, 2011 Phoenix, AZ
Theme: "Next Generation Grid Putting it All Together"
The paper submission site opened in July and to date only 3 papers have been uploaded for PSRC review. Papers must be submitted by Sept 30, 2010. Completed paper reviews are due by Oct 25, 2010. Final Accept/Reject decisions are due by Nov.22, 2010.
I will be sending out a request for reviewers shortly after the Berkley meeting. There will most likely be numerous papers submitted in September and several reviewers will be needed. Please volunteer to review a paper and then finish your review in a timely manner.

Future Meetings

January 10-14, 2011 Sheraton Atlanta, Atlanta, GA (JTCM)
May 16-19, 2011 Renaissance Hotel, Asheville, NC
September 12-15, 2011 Hyatt Regency, Minneapolis, Minnesota
Jan 2012 - TBD (JTCM) location TBD
May 13-17, 2012 Astor Crowne Plaza Hotel, New Orleans (NEW)
September 10-13, 2012 Hilton Portland; Portland, OR

B PES Report Wanda Reeder

No Report submitted.

C. CIGRE B5 Activities Report Adamiak

No report submitted

D. EPRI Report Hughes

No Report.

E. IAS Power System Protection Committee Mozina

The following are items of interest to the PSRC:
Color Book Reorganization Progress – The IAS Industrial & Commercial Power System Dept. — I&CPS (responsible of the IAS color books) held its meeting on May 10-13 in Tallahassee, FL. This group is updating and converting the color book series into individual IEEE standards. The major item of interest for the PSRC is the Buff Book (Protection and Coordination of Industrial and Commercial Power Systems). The draft of the standard on instrument transformer has been

completed and has been submitted for balloting. Progress continues to be slow due to the lack of manpower.

Arc Flash – The IAS is the home of IEEE standard 1584-2004, a key Arc Flash standard that is currently under revision. The WG that is updating this standard will meet at the Petroleum and Chemical Industry Committee Conference (PCIC) to be held in San Antonio, TX in Sept. Significant changes are expected to be made to this standard.

Generator Protection Tutorial – The IEEE Tutorial on the Protection of Synchronous Generator developed by the PSRC J-8 WG will be presented at the
Petroleum and Chemical Industry Committee Conference (PCIC) to be held in San Antonio, TX on Sept. 23. Mike Thompson and Chuck Mozina presented the tutorial. This is the first presentation of the tutorial. 70 people have signed up for the tutorial.

G. IEC Report Udren

TC 95, Measuring relays

TC 95 drives measuring relay standards – electrical and physical environment type testing, design, safety, and functional behavior. They have new interest in application guide development, not yet begun. TC 95 holds its next plenary meeting in conjunction with the IEC General Meeting in Seattle on October 14. The US Technical Advisory Group raised funds (driven by E. Udren and M. Yalla) to support this meeting. This is a meeting to manage strategy and development projects, not to do technical work. Technical work is carried out by Maintenance Teams and Working Groups. The convenor of Maintenance Team 4 (MT4) is Murty Yalla – their current projects are 60255-121 (Functional standard for distance relays) and 60255-187-1 (Functional standard for differential relays – generator and transformer differential). They successfully completed Standards 60255-151 (Overcurrent relays) and 60255-127 (over and undervoltage relays).

Recent TC 95 documents:

- 95-262-DC – TC 95 Strategic Business Plan. The TC leaders have laid out the vision for future development. The USNC is submitting comments based on discussions at WG I4 in Berkeley. Noteworthy are: o Redevelopment of the whole suite of electrical environment standards to make 60255-26 the one relay-specific standard, pointing to base 61000 series standards on test equipment and setups. The whole series of 60255-22-X environmental test standards is to be eliminated.
  - o Development of application guides.
  - o Expansion of liaison relationships.

- Final comments on 60255-127 FDIS, now passed as International Standard.
- Extensive comments on 60255-121 CD, including US comments, to be resolved by MT4.
- Agenda for Seattle TC 95 Meeting, October 14

IEEE PSRC work is helping IEC in support of Smart Grid standards needs:

- C37.111/60255-24 COMTRADE – the completed draft revision from PSRC WG H4 will be circulated to IEC member countries for Dual Logo acceptance.
- C37.118 Synchrophasor Standard – to achieve compatibility with IEC standards organization, PSRC has split into C37.118.1 measurement part, that can be dual logo or IEC standard when completed. There will be a separate C37.118.2 communications part that will make minor fixes to existing C37.118 communications; IEC TC 57 WG 10 has already started working on in IEC 61850-90-5 transport services for synchrophasor values that would become the ultimate international solution based on Ethernet. C37.118.2 will not be the same as 61850-90-5.

TC 57, Power systems management and associated information exchange

See TC 57 liaison report at the end of SC H minutes.

H. Standard Coordinators Report
Gilbert/Winston

The Standards Coordinator meeting with the Chairs of the Working Groups writing and revising standards documents at a session beginning at 1:30 PM on September 13, 2010, in the California of the Doubletree Hotel and Executive Meeting Center. Philip Winston substituted for Jeff Gilbert as the Chair. There were 14 WG represented in attendance. Matt Ceglia provided an update on some of the activities within his scope with a general discussion following. The meeting was adjoined at 2:30 PM.

Standards Activities Since The May, 2010 Meeting

The status of standards activities that have taken place since the May, 2010 meeting of the PSRC are as follows.

1. Standards Published

None

2 Standards waiting to be Published

None

3. Standards Reaffirmed

None

4. Standards submitted for reaffirmation

C37.93 Guide for Power System Protective Relay Applications of Audio Tones over Telephone Channels

5. Standards approved

None

6. Standards submitted for approval

PC37.105 IEEE Standard for Qualifying Class 1E Protective Relays and Auxiliaries for Nuclear Power Generating Stations

PC37.239 Standard Common Format for Event Data Exchange (COMFEDE) for Power Systems

7. Standards to be submitted for approval

None

8. Submitted for Balloting/ Recirculation

PC37.110/COR 1 Guide for the Applications of Current Transformers Used for Protective Relaying Purposes

9. Standards Balloted

C37.90 Standard for Relays and Relay Systems Associated with Electrical Power Apparatus

PC37.110/COR 1 Guide for the Applications of Current Transformers Used for Protective Relaying Purposes

PC37.239 Standard Common Format for Event Data Exchange (COMFEDE) for Power Systems

10. Standards Re-circulated

C37.93 Guide for Power System Protective Relay Applications of Audio Tones over Telephone Channels

PC37.239 Standard Common Format for Event Data Exchange (COMFEDE) for Power Systems

10. Standards to be Re-circulated

C37.90 Standard for Relays and Relay Systems Associated with Electrical Power Apparatus

C37.103 Guide for Differential and Polarizing Relay Circuit Testing

12. Standards due for 5 year review /to be submitted for Re-affirmation

C37.90 Standard for Relays and Relay Systems Associated with Electrical Power Apparatus mario

C37.92 Standard for Low Energy Analog Signal Inputs to Protective Relays bob beresh

C37.118 Standard for Synchrophasors for Power Systems (active PAR - not necessary)
C37.119 Guide For Breaker Failure Protection of Power Circuit Breakers did one
C57.13.3 Guide for Grounding of Instrument Transformer Secondary Circuits and Cases (active PAR - not necessary)

13. Standards withdrawn

None

14. New PARs applied for

PC37.114 Guide for Determining Fault Location on AC Transmission and Distribution Lines
PC37.118.3 Guide for Synchronization, Calibration, Testing and Installation of Phasor Measurement Units for Power System Protection and Control
PC37.239 Standard Common Format for Event Data Exchange (COMFEDE) for Power Systems
PC37.243 Guide for Application of Digital Line Current Differential Relays Using Digital Communication

15. New PARs approved

PC37.118.2 Standard for Synchrophasor Data Transfer for Power Systems
PC37.241 Guide for Application of Optical Instrument Transformers for Protective Relaying

16. PAR Extensions applied for

PC37.236 Guide for Power System Protective Relay Applications over Digital Communication Channels

17. PAR Extensions approved

None

18. Modified PAR approved

PC37.118.1 Standard for Synchrophasor Measurements for Power Systems (PC37.118 modified)

19. Modified PAR Submitted

None

20. PARs Withdrawn

None

21. PARs expiring at the end of 2009

PC37.105 IEEE Standard for Qualifying Class 1E Protective Relays and Auxiliaries for Nuclear Power Generating Stations
PC37.113 Guide for Protective Relay Applications of Transmission Lines- moh ballot by end year
PC37.236 Guide for Power System Protective Relay Applications over Digital Communication Channels

SUBMITTAL DEADLINES & STANDARDS BOARD MEETING SCHEDULE

PAR/Standard Submittal Deadline	**Standards Board Meeting**
February 12, 2010	March 23, 2010
May 7, 2010	June 15, 2010
August 20, 2010	September 28, 2010
October 18, 2010	December 6, 2010

J. NERC Report Cummings

No Report

IV. B. ADVISORY COMMITTEE REPORTS Sanders

Chair: Miriam Sanders
Vice Chair: Bob Pettigrew

B1: Awards and Technical Paper Recognition
Chair: Bob Beresh

Vice Chair: Solveig Ward

The B1 Working Group met on September 14th, 2010 in Berkeley, CA, with 6 of its 7 members.

The minutes of the last meeting were reviewed and approved.

The WG Guidelines were presented to the group for review. This document includes a list of the awards and recognitions to prepare for PES and PSRC. To complete the guide we need to investigate IEEE awards, and document the selection criteria for some awards.

This was the last meeting for Solveig Ward as a Vice Chair of the group. Continuing the subcommittee rotation, this time is subcommittee H turn. Eric A Udren has accepted the Vice Chair assignment for the group.

The group reviewed the list of awards to be handed out. At the Main Committee Meeting we will present 5 certificates of appreciation from PES and 7 service awards prepared by Mal Swanson.

Prize paper and Outstanding WG awards were discussed. Selection process is underway. Nominations are due on November 14th.

With no additional business to discuss the meeting was adjourned.

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B2: Fellows Awards
Chair: J.S. Thorp
No Report
B3: Membership Committee
Chair: M.J. Swanson

Attendance during the PSRC meeting was approximately 230. This is excellent attendance for a September meeting.
15 new attendees were in our Newcomers Orientation meeting on Tuesday.
No retention support letters were written. Nine Service Awards were presented.

B4: O & P Manual and WG Training

Chair: J Appleyard O&P Manual
Chair: R Hunt WG Training

Working group chair training session was held on Monday afternoon.

B5: Bibliography and Publicity
Chair: T.S. Sidhu
Vice Chair: M. Nagpal
WG B5 met on Sept. 13, 2010 with two members and one guest in attendance. 2008 and 2009 bibliography papers have been submitted to IEEE Trans. On Power delivery following approval from the PSRC officers. Assignments for preparing 2010 bibliography paper were made. Mel Swanson will prepare the publicity
report when requested by the PSRC Chairman. Tarlochan Sidhu will check with the PSRC webmaster on the status of bibliography database

B8: Long Range Planning
Chair: Charlie Henville

B9: PSRC Web Site
Chair: Russ Patterson
Working Group B9 did not meet.

V. SUBCOMMITTEE REPORTS

C: SYSTEM PROTECTION SUBCOMMITTEE

Chair: R. Hunt
Vice-Chair: S. Ward

The C System Protection Subcommittee met on Wednesday, September 15, 2010, in Berkeley, CA with 24 members and 26 guests in attendance. Quorum was reached.
8 Working Groups and 1 Task Force met at this meeting.
The members of the Subcommittee approved the minutes of the May 2010 meeting.
One working group, C11 Protection System Testing, has completed the assignment and requested to be disbanded. The request was approved by the C members.
New members: Randy Cunico, Rafael Garcia, Yi Hu, Dean Miller, and Farnoosh Rahmatian were welcomed as members of the C Subcommittee.
PSCE liaison report: Nothing to report.
PSSC liaison report: The Power System Dynamic Performance Subcommittee (PSDP) has accepted an invitation to join the PSRC at the January JTCM meeting. It is proposed that a one day meeting on Monday 10th January at which all of the PSRC will be invited to attend, and as many of the PSDP as are able to attend. Four presentations have been identified regarding work that the Subcommittee C (or Subcommittee I in one case) has sponsored in one case.

Reports from the WG Chairs

C2: Role of Protective Relaying in the Smart Grid
Chair: Alex Apostolov
Vice Chair: Mark Peterson
Output: IEEE Report
Established: January 2010
Expected Completion Date: To Be Determined

Assignment: Identify the functions and data available in Protective Relaying Devices that are used at different functional levels and different applications and can be used within a Smart Grid. Describe the use of interoperable data formats for protection, control, monitoring, recording, and analysis.
Working group C2 held a meeting on Tuesday, September 14, 2010, in Berkeley, CA, in a single session with a total of 55 people in attendance (17 members and 38 guests).
The session began with a review of the previous meeting's minutes and the working group's assignment.
The output of this will be to produce a section of a report coordinated with WG H2.
Assignment submissions were reviewed and commented, as time allowed, and volunteers agreed to re-submit their assignments as follows:
Smart grid definition
– Not assigned
Introduction (what is this all about)
– *Rene Midence, Marco Janssen* – Submitted, discussed, re-assigned

Multifunction protection devices
– *Rene Midence* – Not submitted, discussed, re-assigned
Protection communications
– *Rene Midence* – Not submitted, discussed, re-assigned
Impact of protection on smart grid functions
Dynamic loading of transformers, cables and transmission lines
– *Pouria Naisani* – Not submitted, re-assigned
Adaptive protection during changing system conditions
– *Juan Gers* – Not submitted, re-assigned
Condition monitoring
– *Paul Myrda* – Not submitted, re-assigned
Using existing protection functions
Measurements
– *John Csisek* – Submitted, discussed, re-assigned
Synchrophasors
– *Mark Peterson* – Submitted, re-assigned
Status information
– *Rene Midence* – Submitted, discussed, re-assigned
– *Pouria Naisani* – Not submitted, re-assigned
– *Adi Mulawarman* – Submitted, discussed, re-assigned
Waveform, disturbance and event recording/reporting
– *Mark Peterson* – Not submitted, re-assigned
– *Aaron Martin* – Not submitted, re-assigned
Fault location
– *Aaron Martin, Sukumar Brahma* – Submitted, reviewed, re-assigned
System documentation
– Not assigned

The following members offered to provide contributions on one or more topics: Solveig Ward, Dolly Villasmil, Tom Jauch, Mike Reichard and Demetrios Tziouvaras.
It was stressed that the group needs to be sure coordinate with working group H2 and to not duplicate their efforts.
Writing assignments and contributions need to be submitted by the group to the chair and vice chair by December 1, 2010. Earlier contributions are encouraged.
The working group chair and vice chair will organize the submissions and post the revised document by December 15, 2010. All members need to review the document before the next meeting, and come prepared with comments and contributions.

C5 Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units PC37.242
Chair: Jim Hackett
Vice Chair: Paul Myrda
Output: Guide C37.242
Established: May, 2010
Estimated Completion Date: June, 2011

Assignment: Develop a Guide for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMU) for Power System Protection and Control
Scope: The document provides guidance for Synchronization, Calibration, Testing, and Installation of Phasor Measurement Units (PMU) applied in Power System Protection and Control. The following are addressed in this Guide:

- Considerations for the installation of PMU devices based on application requirements

and typical bus configurations

• Techniques focusing on the overall accuracy and availability of the time synchronization system

• Test and calibration procedures for phasor measurement units (PMUs) for laboratory and field applications

• Communication testing for connecting PMUs to other devices including Phasor Data Concentrators (PDC)

Purpose: This guide is intended to be used by power system protection professionals for PMU installation and covers the requirements for synchronization of field devices and connection to other devices including Phasor Data Concentrators (PDC)

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The Working Group met on Sept. 15, 2010 in a double session. The first session had 6 members and 18 guests and the second session had 7 members and 20 guests.
The IEEE-SA Patent Slides were shown.
The minutes of the May 12th meeting were approved in the second session with a quorum of members.
The C5 Working Group requested that its name be retained as IEEE PC37.242 to avoid confusion with C37.118 standards under development/revision within the H Subcommittee.
Task Groups were assigned to review and update: Section 2 (Synchronization Techniques), Secton 3 (Measurement Accuracy Characterization), Section 11 (Installation, Commissioning and Maintenance), and Section 15 (System Testing and Calibration. The Task Groups will provide the members with their revised document sections by Oct. 31th.
Another Task Group was assigned to incorporate the above revisions into Draft 1 of the Guide by November 31st. This draft will be reviewed by the members with their comments requested by January 5th, 2011.
The C5 Working Group will coordinate with the H11 Working Group. C5's
Draft 1 of the guide document will be posted on the C5 web page as soon as the draft is available. This document will be password protected and the password made available to working group members.

C13: Undervoltage Load Shedding Protection
Chair: Miroslav Begovic
Vice Chair: Shinichi Imai
Output: IEEE Report
Established: September 2005
Expected Completion Date: May 2011

The WG meet on September 14, 2011, in one session, attended by 2 members and 4 guests.
Draft 5.4 was briefly reviewed and editorial comments by Randi Cunico and Jeonghoon Shin will shortly be incorporated in the final version of the report, which is now ready for subcommittee vote and comments.
Action items to finish the report were proposed as follows and were agreed by members in attendance.
Action items:

- Promptly send the final version of the report to the subcommittee
- Voting and commenting by the subcommittee to be done by End of October
- Start work on preparing the summary report paper overview to be ready for January meeting

WG members interested in contributing to the paper should inform Miroslav Begovic

C14: Use of Time Synchronized Measurements in Protective Relaying Applications

Chair: Jim O'Brien (Jim.O'Brien@duke-energy.com)
Vice Chair: Alla Deronja (aderonja@atcllc.com)
Output: IEEE Report
Established: May 2007
Expected Completion Date: May 2011

Assignment: Produce a general report to PSRC Subcommittee C outlining practical protection applications using synchrophasors.
Working group C14 met on September 13, 2010, in Berkeley, CA, in a single session chaired by Jim O'Brien with 10 members and 24 guests present.
The chair distributed the latest draft of the Report, which was discussed, including the latest received contributions.

A Section I Introduction was added to the report.
In Section II Background, Mark Adamiak was to work with Juergen Holbach to update subsection II.d according to the discussion at the May meeting and add the P- and M-class synchrophasor definitions to subsection a, Definition of synchrophasor measurements. Mark will be contacted regarding the status of this contribution.
Herb Faulk contributed a new subsection to Section II Background on the subject of the impact of reporting rates and latency on synchrophasor measurements. Herb will be contacted regarding the toggle term he used to make it more specific and title Jitter, according to the comments during the meeting.
Ken Martin updated Section III *Communications Infrastructure*.
A question was raised about defining al the terms used in the report such as UTC, GPS, etc. An intend is to define each term the first time it appears in the Report and afterwards use its acronym.
Another comment was to consistently utilize only one term like samples/seconds vs. records/seconds or frames/seconds.
A missing assignment is for Section III *Communications Infrastructure*, III.b *Reliability*, which was assigned to Bill Dickerson. A comment during the meeting was that it would be important to mention in this subsection not to use GPS for critical applications and mention alternatives such as the IEEE 1588 and IEEE 37.238 standard protocols.
In Section V *Future Applications*, a contribution was made by Gary Kobet for subsection V.b *Loss of field*. Gary will make generic references on the example figure and make the figure presenting the logic bigger and legible.
Another comment was to clearly define Present and Future Applications for synchronized phasor measurements. Yi Hu volunteered to contribute.
Subsection V.f *Distributed generation anti-islanding* will be moved to Section IV *Present Applications* since this phasor measurement application was already implemented.
Subsection V.g *Remote synchronism checking* was previously questioned to not be accounted as a protection application and will be removed from the Report.
Section IV.e Negative and zero-sequence line differential protection will be moved to Section V *Future Applications*.
The WG targets May of 2011 for finishing the report, and the time has come to start editing the report. Fernando Calero will review Sections I, II, and III. Alla Deronja will review Section IV *Present Applications*, and Don Lukach will review Section V *Future Applications*.
The chair will update the Report based on the comments made at the meeting by October 4 and distribute the Report to the section reviewers. The comments from the reviewers are due to the chair by December 1, 2010.

C15: Design and Testing of selected SIPS
Chair: J. Sykes

Vice-Chair: Y. Hu
Output: Report on industry practices in design and testing of selected SIPS
Established: September 2008
Expected Completion Date: December 2012

Assignment: Write a report in industry practices and testing of selected SIPS (System Integrity Protection Schemes)
C 15 did not meet in Berkeley due to an unexpected conflict of the Chair.
The working group will meet at the January 2011 PSRC meeting in one session to review the next draft of the report.

C16: <u>Relay Scheme Design Using Microprocessor Relays</u>
Chair: R Lascu
Vice-Chair: T. Seegers
Output: Report
Established: September 2008
Expected Completion Date: To be determined

Assignment: Write a supplement to the existing 1999 relay trip circuit design paper as an IEEE report to address microprocessor relays.
Introductions were made with Raluca the chair presiding. Discussion of writing assignments. Ken Berhendt discussed section 2.2.
C. Sufana joined the working group as member.
There was some discussion on the testing section. Don Lukach wrote section 5.5. Testing involves both element and functional type tests but the there are some caveats. Jay Sperl wrote section 5.6. Jay indicated that some rewording should be done to tighten it up a little. Concern is with element testing and how it is done. Pitfall is to validate that the methodology doesn't change the other settings of the relay. Must make sure any settings that were done for test are undone before being left. Need to prove relay will trip if all of the actual settings and logic is used. Need to worry about NERC audits.
It might be best to use the SOE rather than changing settings to do a test. Need to also do a full system "end to end" test.
Need to present risks and benefits of testing individual elements. Could set up every trip output to have different element.
Detroit Edison alters the settings to do the element tests and then also does functional tests.
Dean Miller said that the design needs to be made that allows for the devices to be tested.
Action items to have sections 5.1, 5.5 and 5.6 revised by J. Sperl and D. Lukach. Jerry Johnson not finished with his review of 4.4.1; will complete before the next meeting. Gene mentioned that the monitoring section may need to somewhat match the PRC 5.
Section 2.3 needs to have a table added.
Writing assignments are due by the end of October.
Ken Berhent commented about routine testing. For routine testing you may not need to redo every element but do need to check the inputs, etc. He will include comments in Section 2.2. Jay Sperl indicated that sections 5.5 and 5.6 might need to be moved up to section 5.1. Robert Frye said that TVA actually redesigned the switch house, the racks, cable routing, everything to get microprocessor relays installed. Robert said he could write something of what they did. If the old E/M system had 2 (or 3) phases relays plus 1 ground relay and one new microprocessor is to be used, is a second microprocessor needed? Redundancy is the question. Section 2.4 discusses redundancy. There is a NERC requirement in the development stage about redundancy. Mike Jensen to research to see if there are NERC requirements which apply to the paper.

C17: <u>Fault Current Contribution from Wind Plants</u>
Chair: D. Miller
Vice-Chair: G. Henneberg

Output: Report by the Joint Working Group
Established: January 2009
Expected Completion Date: 2011

C17 is part of a Joint Work Group among Transmission and Distribution Committee (T&DC), Electric Machinery Committee (EMC) and Power System Relaying Committee (PSRC) C17.

Joint WG Assignment: To characterize and quantify short circuit current contributions to faults from wind plants for the purposes of protective relaying and equipment rating, and to develop modeling and calculation guidelines for the same.

C17 WG Assignment: To support the activities of the Joint Working Group on Fault Current Contributions from Wind Plants in the production of a report that characterizes and quantifies the short circuit current contributions to faults from wind plants for the purposes of determining protective relay settings and fault interrupting equipment ratings. The report will provide guidelines on the modeling and calculations for that purpose.

The C-17 Work Group met in a single session on Tuesday, September 14, 2010 in Berkeley, CA with 17 members and 19 guests.

The C-17 WG reviewed and approved the WG minutes from the May 2010 meeting in Madison, WI. Minutes of the joint WG at the PES General Meeting were distributed by email to WG members, but not reviewed here because C-17 is not the joint WG.

Charlie Henville presented his analysis of the fault that Dean Miller described at the May 2010 meeting. This event was a L-G fault at 138 kV with wind farm contributions from 61 of 67 Type II units. Mr. Henville compared sequence quantities as measured from the fault data versus those calculated from modeling data. The conclusions were that wind farm model and fault data provided good zero sequence agreement (Y-delta-Y transformer), negative sequence agreement was not quite so good (~10% error, Z2 ~ Z1" seemed a better approximation than Z2 ~ Z1'), and Z1 changed rapidly and significantly, perhaps to quickly to be reasonably approximated through the one-cycle relay data filter.
Sukumar Brahma presented his EMTP analysis of this same fault. The CTs and relay filtering was not included in the model and the exact point-on-wave to initiate the fault wasn't quite exact, though there was still reasonable agreement between the model and EMPT waveform peak values. Future work anticipates calculating sequence quantities during the fault and modeling faults on the wind farm collector system.

Dean Miller presented an analysis of a fault in June on a 230 kV line serving a wind farm composed of 66 GE 1.5 MW Type III turbines. All units were on line at the time of the fault, but were producing a total of only 27 MW (rated 100 MW). Dean used a detailed model that included each unit of the wind farm. The system fault contribution matched the model fairly well. The plant contribution produced some waveform results that Dean had not yet explained. This sparked a lively discussion of the data; the electronic controls may have limited the individual unit output.

There was a discussion on whether fault interrupting equipment issues and data requirements for modeling faults interior to the collector system of the wind plant should be included in the report as originally planned. The result of the discussion was that there was merit to including both topics. The issue of the sustained dc offset of the current from the wind plant would be an issue to be included for the interrupting rating of the 34.5kV breakers.

The next joint work group meeting will be at the PES General Meeting in Atlanta, GA January 10-14.

CTF3: Joint meeting with Power System Stability Controls Subcommittee
Chair: C. Henville
Vice-Chair:-
Output: Recommendations to the subcommittee
Established: January 2010 Expected completion date:-

The group met with 13 attendees present. The Power System Dynamic Performance Subcommittee (PSDP) has accepted an invitation to join the PSRC at the January JTCM meeting. It is proposed that a one day meeting on Monday 10th January at which all of the PSRC will be invited to attend, and as many of the PSDP as are able to attend. Four presentations have been identified regarding work that the Subcommittee C (or Subcommittee I in one case) has sponsored in one case. The following individuals have agreed to make presentations at the Monday 10th January meeting.

Miroslav Begovic, Chair of the Undervoltage Load Shedding WG C13.
Damir Novosel, Chair of the Relaying Performance under Stressed Power System Conditions WG (now disbanded).
Vahid Madani, Chair of the Global Industry Experience with SIPS WG C4.
Tarlochan Sidhu, Chair of the Relaying Issues with Power System Restoration WG (now disbanded).

It should be noted that Mike Adibi of the PSDP has been asked and has agreed to make a presentation on Power System Dynamic Performance issues associated with power system restoration at the January meeting.

After the J Subcommittee JTF4 has decided on its presentations, Charlie Henville will write to the PSDP advising them as to what is proposed to be presented and asking their input as to what they could present.

Charlie Henville will also arrange for a meeting room on the Monday of the January, and would be grateful if the officers could let the PSRC know about this extra meeting in its announcement about the JTCM.

D: LINE PROTECTION SUBCOMMITTEE
Chair: M.J. McDonald
Vice Chair: Russ Patterson

The Meeting convened at 1:30 p.m.

Following introductions and verification of quorum (30 out of 45 members present), Chairman McDonald covered items of interest from the Advisory Committee.

All working group reports were presented.

After a lengthy and informative discussion in regard to SIR; including what it means, how it is calculated and what effect it may have on relay settings, a discussion on whether a group should be formed to address issues brought up during the discussion was tabled by the Chairman for future consideration.

Coordination Reports
None

Liaison Reports
None

Old Business
None

New Business

Jerry Johnson, Normann Fischer, Randy Cunico and Ryland Revelle were welcomed as new members of the SC.

The chairman announced that Russ Patterson will take over as D SC chairman starting with the January meeting and that Gary Kobet will assume the vice chairman position. Congratulations were extended to both.

Line Protection operations of interest
None

The meeting was adjourned at 2:28 p.m.

Reports from the WG Chairs:

D2: <u>Revision of C37.104 Transmission and Distribution Reclosing Guide</u>
Chair: Gary Kobet
Vice Chair: Greg Sessler
Output: IEEE Guide
Established: September 2008
Expected completion date: 2012

Assignment: Revise and update the IEEE Guide C37.104 - Guide for Automatic Reclosing of Line Circuit Breakers for AC Distribution and Transmission Lines.

Working Group D2 held its meeting on Monday, September 13. There were 17 of 32 working group members and 4 guests present. One of the guests joined the working group as a new member.

The IEEE patent requirement slides were presented, and attendees were given the opportunity to identify any known patent claims.

The D2 meeting notes from the May, 2010 meeting held in Madison, WI were reviewed and approved without modification. The chairman demonstrated access to the working group documents located on D2 WG secure area of the PSRC website, and indicated that login information has been emailed to working group members.

The chairman reviewed the working group Assignment, Scope and Purpose, and noted that the PAR for this working group expires on 12/31/2013. Copies of Draft 2 of the guide were distributed via email to all working group members.

Working group writing assignments were reviewed, with pending and new assignments noted on the latest version of the guide. The working group discussed reorganizing the guide to eliminate duplication of topics that currently exist in the separate transmission/distribution sections. Working group members agreed that common topics be consolidated into clause 4, and those issues specific to transmission or distribution auto reclosing applications remain in clause 5 or

clause 6. Walter McCannon, Ryland Revelle, John Wang and Mohammad Zubair volunteered to review clauses 5 and 6 to identify topics that are common to transmission/distribution applications, and edit the guide by consolidating this information into clause 4. Charlie Sufana and Ken Behrendt volunteered to review and edit clause 4 of the guide by relocating topics specific to either transmission or distribution to the appropriate system specific clause. Charlie and Ken will also provide a recommendation regarding the exclusion of the auto reclosing nomenclature defined in clause 4.2.

In addition, Joe Perez volunteered to develop one or two auto reclose examples to be included in clause 4, and Robert Frye will review a recent Georgia Tech conference paper on auto reclosing for inclusion of relevant information in the guide. Robert will also clarify and expand the definition of "normal after open", which is referenced in clause 4 of the guide.

Working Group members were requested to consolidate group assignments and send to the chairman prior to November 1, 2010. The chairman will provide Draft 3 of the guide to all working group members by December 1, 2010.

D3: <u>Considerations in Choosing Directional Polarizing Methods for Ground Overcurrent Elements in Line Protection Applications</u>
Chair: Meyer Kao
Vice Chair: Elmo Price
Output: Report to the Line Subcommittee of the PSRC
Established: September 2009
Expected completion date: 2012

Assignment: Prepare a report to the Line Subcommittee of the PSRC on identifying different polarizing methods, address issues related to the application of different methods, and make recommendations in choosing the polarizing method.

D3 working group held its meeting on Tuesday September 14, 2010 at 3:30 PM with 30 attendees, of which 15 are members, and one new member to the working group

The assignment of the working group was presented.

Minutes from the May 2010 meeting were approved with no changes.

Writing assignments assigned from the previous meetings were discussed.

Graphic representation on the location of polarization sources in the sequence network was presented with different type of transformers, such as wye-delta, wye-wye-delta.

Application of zero sequence current polarizing method was discussed. Two new writing assignments were assigned as result of this. One writing assignment is to address the issue of the polarizing current where it can be zero, or even reverse as compared to the line residual ground current for a forward direction line fault. Another writing assignment is assigned on specifying the CT ratio for the polarizing CT on the transformer neutrals.

The write up on the dual polarizing method, the combination of zero sequence voltage and/or zero sequence current method, was discussed. Writing assignment was assigned to provide examples of combination of the two, or either or of this dual polarizing method.

The write up on misoperation due to mismatch of polarizing methods on line terminals in a communication assisted trip scheme was discussed. There was also a discussion on mismatch of different relays at the line terminals, which can lead to misoperation. A paper about a misoperation in Australia will be presented and discussed in the next meeting. Then the working group will decide to whether to include this item in the report.

D6: AC Transmission Line Model Validation
Chair: Tony Seegers
Vice Chair: Sam Sambasivan
Output: Report to the PSRC
Established: January 2009
Expected completion date: May 2013

Assignment: The WG will prepare a report to the main committee on the processes, issues, problems and methodology of validating software model parameters for AC transmission lines used for relaying. The report will not include details of relay curve models or other similar relay modeling. The report will also not include specific EMTP modeling.

The D6 working group met on Wednesday, Sept 15, 2010 at 8.00 am with 14 members and 6 guests present. 3 new members joined the group and the WG stands at 25 members.

Draft 1.2 of the document was sent to the members prior to the meeting, and hardcopies were handed out for the guests at the meeting. Members and guests were asked to comment on the latest draft.

Steve Turner made a presentation on Verification of Transmission Line Zero Sequence Impedance using Synchronized Double ended Fault location.

Lee Wang discussed his contribution on Fault calculation using impedance based method. Mukesh Nagpal presented his contribution on Direct Measurement as a Model verification method.

There were discussions on special concerns with modeling cable and it was decided to expand this section. Demetrios Tziouvaras volunteered to jointly write this section with Steve Turner.

Joe Uchiyama agreed to review his submission on section 3.8 and edit the materials, make shorter paragraphs and resubmit the edited files as requested.

Ken Behrendt agreed to forward a paper written on Challenges of Long Line Protection which describes the differences between modeling the impedance with a pi versus a hyperbolic model with distributed parameters. This will be used as a reference paper for the report.

All the remaining assignments are due by the end of November, 2010. A completed draft with all the missing sections will be sent out before the next meeting and we plan to take up the review of the report in the next meeting.

Based on the request made at the earlier working Group meeting, the Omicron presentation about direct impedance measurement is added to the working group web page.

D9: Revision of C37.113 – Guide for Protective Relay Applications to Transmission Lines
Chair: Mohindar Sachdev
Vice Chair: Simon Chano
Output: Revised IEEE Guide C37.113
Expected completion date: 2011

Draft 4

Assignment: Revise and update IEEE Standard C37.113-1999 Guide for Protective Relay Applications to Transmission Lines

The WG met in two sessions; the first session was held at 4:30 PM on September 13, 2010 in Berkeley Room of Doubletree Hotel and Executive Meeting Center, Berkeley, CA. Thirteen members and eleven guests were present in this session. The minutes of the WG meeting held in Madison, WI could not be approved because of lack of quorum in both sessions.

The Chair reported that he received additional ballots after the May meeting and in all approximately 1000 comments were submitted with the ballots. He further reported that he received a contribution from Dr. Bogdan Kasztenny on out-of-step protection that was incorporated in Draft 4. Out of 1000 comments submitted by the members, more than 600 were addressed. Draft 4 was distributed among the WG members for their review and for comments in two weeks time. The members who had submitted comments were also provided responses that showed the actions taken to address their comments.

A few comments on Draft 3 that could not taken care of were discussed and the members provided their input. Changes will be made to Draft 4 as per input of the WG.

The first session concluded because no additional issues were raised.

The second session was held in the El Dorado Room at 9:30 AM on September 15, 2010. Thirteen members and sixteen guests were present in the second session. There was no quorum in this session either.

The Chair briefly summarized the proceedings of the first session. The Chair reported that he had conducted an Electronic Ballot seeking permission of the WG to propose to the D Subcommittee to request the Main Committee to grant permission for submitting the draft to the Standards Association for balloting. Only twenty-four WG members responded to the Ballot. The ballot failed because twenty-four is less than the 75% of the total membership of the WG. The Chair reported that he had the same problem when Draft 3 was balloted.

It was suggested and agreed that actions be taken to either remove or convert the non-participating members of the WG to non-voting status as soon as possible.

A group of three members consisting of Mike McDonald, Pratap Mysore and Rick Taylor was formed to review Draft 4 to identify if there are technical inaccuracies in the Draft before seeking a WG ballot on the suitability for seeking permission of the Subcommittee for requesting Main Committee's approval for submitting the Draft to the Standards Association for balloting.

The second session concluded at the end of this business.

D11: <u>Effect of Distribution Automation on Protective Relaying</u>
Chair: Fred Friend
Vice Chair: Jerry Johnson
Output: Report to the PSRC
Established: January 2005
Expected Completion Date: January 2011
Draft 3.2

Assignment: Prepare a special report to the PSRC that describes the effect of Distribution Automation on Protective Relaying

The working group, chaired by Fred Friend, met on Tuesday with 11 members and 21 guests present, including 1 new member – Farajollah Soudi.

Minutes from the May meeting in Madison were reviewed and approved.

The document was reviewed, discussed, and changed with input from the working group as follows:
Data Acquisition- should this term be included in our document? Consensus was to remove the term from the document.

Mike Meisinger comment, do not repeat all the history that got us to where we are today and please do not use the document for specific product advertising. As a result of this discussion, Don Parker will review Joe Koepfinger's write up (what got us here) and determine what part of it has relevance to the paper. Specific product name/references will be deleted and replaced with generic language.

Deferred discussion on Section 5.0 until next meeting when the author should be present.

Jay Sperl agreed to changes proposed in Section 5.

Section 6.0, Gers and Meisinger Section

- Bullet 6.1 delete product name
- Manually or automatically, revised wording.
- FLSIR - NIST recognized - OK term leave in

Mike and Juan are satisfied with the section.

6.6.2 Fault locating, Don Parker and Farajollah Soudi will re-write the paragraph to include what impact DA is has on networks.

6.6.5 Editorial change by Fred Friend.

6.6.7 Not discussed as neither Charlie Sufana nor Wayne Hartman were present. Discuss next meeting.

6.6.7.5

- DER vs. DR, IEEE 1547 refers uses DR, leave all references in this document as DR.
- Mike M. – need to add "may or may not contribute any fault current"
- Discussion on "anti-islanding "term with DA and in another section, anti-islanding related to Transfer Trip of the DR, what does it mean? IEEE 1547 document uses **unintentional islanding** and **intentional islanding,** and we should do the same.

Don Parker made a presentation on the virtues of multifunction network protector relays, but the presentation did not indicate support for the theme of our paper, the effect of DA on PR.

Please provide writing assignments by 1 December 2010.

D21: Supporting IEC STD for Distance Relay Characteristics
Chair: Alex Apostolov
Vice Chair: Alla Deronja
Output: IEEE/IEC Standard

Established: September 2006
Expected Completion Date: December 2011

Assignment: Provide an IEEE/PSRC technical input to the ongoing development of IEC Standard 60255-121, dealing with distance relays to standardize impedance relay characteristics, performance, accuracy, and testing aspects.

Working Group D21 met on September 14, 2010, in Berkeley, CA, in a triple session chaired by Alex Apostolov with 7 members and 9 guests present. One guest joined the working group as a member, and three actively contributing guests were promoted to the full WG membership.

The working group previously reviewed the standard draft and provided comments. These comments, along with the comments received from Canada and other countries, were addressed at IEC TC95 Maintenance Team 4 meeting in Beijing.

The working group addressed the comment resolution by MT4 provided by the IEEE (USA/Canada) at the September 14 meeting. There are 25 pages of the US/Canada comments, and the working group was able to address 11 pages.

Some of the highlights of the addressed comments are as follows.

One of the comments, a subject of a heated discussion, was type manufacturer testing based on steady state impedance characteristics. Although these tests are no longer adequate, they were included in the standard to accommodate traditional testing methods. The MT4 resolution was to move the Ramping Methods for Testing Basic Characteristic Accuracy clause to Annex while leaving the remaining 17 pages of the material in the main body of the standard.

The working group proposed the following addition to be included in 6.2.1 General Section: these characteristics are tested under quasi steady state conditions, and these tests should not be used as criteria for performance testing.

Another set of comments concerned CVT models for simulating CVT transients. CVTs are different among the vendors. The utilities should work with their vendors to create specific tests for their use. An addition was proposed by the working group stating that this test is only generic, and the user shall, with the manufacturer's help, define user's specific applications; and the following factors such as SIR, capacitive value of capacitors, type of ferroresonant suppression circuit, etc, need to be accounted for.

MT4 will meet in Seattle on October 9-213. The input from the September WG meeting will be addressed at that meeting.
Normann Fischer and Pratap Mysore will provide data for the standard line configuration models to address comments on tests on capacitance values and harmonics.

Bogdan Kasztenny and Normann Fischer may attend the MT4 meeting in Seattle, and Murty will provide them with the revised standard draft and the updated comments resolution document before the Seattle meeting.

D22: <u>Performance Testing of Transmission Line Relays for Frequency Response</u>
Chair: Tom Wiedman
Vice Chair: Jun Verzosa
Output: Report
Established: May 2007
Expected completion date: May 2011

Assignment: Investigate the feasibility of defining a range of frequency and rate of change of frequency to be using in a performance specification for protective relaying functions. The WG will develop a test process for transmission line relays subjected to off frequency disturbance including rate of change of frequency conditions during stressed system conditions.

The D22 working group met Tuesday, September 14, 2010 1:30 pm at the Doubletree Berkeley Marina Hotel with 6 members and 5 guests present. WG stands at 24 members. This was the WG's tenth meeting.

WG Vice-Chair Jun Verzosa presented an updated the test process, the Comtrade Calculator. This program automatically creates Comtrade test files for the off-frequency/off voltage tests included in the WG report sections 10.1, 10.2, and 10.3. Ilia Voloh presented a report on the successful feasibility tests he performed with the Comtrade Calculator over the summer. The update was to add pre-test voltage capability per the results from Ilia's tests. Jun, Ilia and Tom believe that the users of the test should consider a 10% margin between the test load current and the relay characteristic.

At this point, the WG considers the Comtrade Calculator to be complete. The WG is indebted to the hard work of Jun Verzosa (Doble Engineering), Phil Winston (Georgia Power), Aaron Martin (BPA) and Ilia Voloh (GE). Draft 6 of the paper will include a section by Jun that describes the Comtrade Calculator. Draft 6 will be edited prior to the January 2011 meeting. Comments at the January meeting will be incorporated into Draft 7 and then submitted to the WG for Ballot.

D24: <u>Transmission Line Applications of Directional Ground Overcurrent Relays</u>
Chair: Don Lukach
Vice Chair: Rick Taylor
Outputs: Report to WG D9, PC37.113, Guide for Protective Relay Applications to Transmission Lines and Report to the PSRC
Established: May 2007
Expected Completion Date: September 2011

Assignment: Prepare a report to the Transmission Line Guide revision working group and PSRC on the justifications and application criteria for directional ground overcurrent relays

The working group met with 12 members, 9 guests, for a total of 21. Two of the guests became members.
The May 2010 meeting minutes were approved as submitted.
All writing assignments were submitted by the members prior to this meeting and were incorporated into Draft F of the report.
Section 5.2 will be revised to focus on standing unbalance and consistency versus the use of specific fault resistance values.
Section 5.10.2 will be revised to clarify intent and to add further discussion about ground sources (paths), such as auto-transformers.
All writing assignments were requested to be submitted by October 31, 2010 in order to support the full document review by a team of three reviewers. The review completion date of November 26, 2010 was requested to support member review prior to the January 2011 meeting.
The requirements for the next meeting are a single session, meeting room for 30 people with a computer projector.

D25: <u>Distance Relay Response to Distorted Waveforms</u>
Chair: Karl Zimmerman
Vice Chair: Aaron Martin
Output: Technical Report to Line Protection Subcommittee
Established: January 2009

Expected completion date: January 2012
Latest Draft: 1.0

Assignment: Write a technical report to the Line Protection Subcommittee on the performance of distance elements with distorted waveforms.

The working group met in Berkeley on September 14 2010 at 8:00 AM with 8 members and 8 guests. Randy Horton joined the working group.

After introductions, Draft 1.0 of the paper was distributed. Joe Mooney presented Section 2 on Distance Element Design issues, which included a discussion of the mho characteristic and filtering. The ensuing discussion led to suggestions that we add a section on quadrilateral element design, add references and a summary of the purpose of filtering.

Normann Fischer presented a section on distance element response to CVT transients. This led to suggestions that the section be expanded to include the basic types of ferroresonant suppression circuits used by CVTs, and an application section, including the impact of SIR.

Joe Mooney then presented a section on distance element response to CT saturation. We decided to limit the discussion of the nature of CT saturation, but instead reference other documents. One suggestion is to add an application with two breakers (e.g. ring bus or breaker-and-half) to discuss impacts.

Randy Horton agreed to write a section on the impact of wind turbine sources on distance element, with specific mention of Type 3 wind farms.

Writing assignments are due by end of November.

D26: <u>Revision of C37.114 Fault Location Guide</u>
Proposed Chair: Joe Mooney
Proposed Vice Chair: Randall Cunico
Output: IEEE Standards Guide
Established: 14 Jan, 2010
Expected Completion Date: December 2014

Assignment: Update and revise C37.114: IEEE Guide for Determining Fault Location on AC Transmission and Distribution Lines to include new developments in fault locating methods and techniques.

There were 20 attendees with 12 members and right guests. Three guests became members of the Working Group. There are now 24 members on the Working Group.

The chair reviewed the IEEE Patent Policy and attendee's were provided the opportunity to respond. There were no responses.

Minutes from the May meeting in Madison were approved by the attending members.

The PAR application has been submitted and will be reviewed at the next Standards Approval meeting in September. The PAR has an expected completion date of 2014.

The existing C37.114 was reaffirmed in 2009 and is valid for another 5 years. The main comments to be addressed are as follows:

- Definition of error for fault location
- Application on Series compensated lines

The group had a good discussion on definition of error for fault locating. It was generally agreed that the method for calculating error in the guide needs additional description and clarification. The error calculation is suited to looped systems but may not be applicable to distribution systems. Multiple definitions may be needed considering differing applications and system configurations.

The group provided input on new technology and techniques that may be included in the guide. Whether to include it in the guide should be qualified by, "Is it something that can be implemented today?" There were many good suggestions including synchrophasors, decision tree techniques, communications between relays, meters used to determine outage location, protection zones for selectivity, and GIS applications. It was also suggested that reviewing superconductor applications might be beneficial.

Action Items for next meeting:

- All members READ THE GUIDE
- Steve Turner to do literature search for new technologies and techniques • List of documents
  • Possibly review/classify and present at next meeting

- Bring new ideas in fault locating.

D27: Creation of Line Current Differential Guide
Chair: Juergen Holbach
Vice Chair: Ryland Revelle
Output: IEEE Guide
Established: May 2010
Expected Completion Date: February 2013

Assignment: Create a "Guide for the Application of Digital Line Current Differential Relays using Digital Communications."

There were 18 of 30 working group members and 27 guests present. Thirteen of the guests joined the working group as new members, bringing total membership to 43.

Solveig Ward gave a presentation covering the fundamentals of how line current differential schemes operate, some of the advantages/disadvantages they have, and how communications plays an important role in how they operate.

A discussion of whether or not phase comparison schemes should be included in this document ensued. It was pointed out that phase comparison schemes were first created for low-bandwidth analog communication paths and that they have been outdated by the availability of a digital communications path. A general interest vote was taken, and the results were that the majority felt these schemes should not be included in the document.

Shyam Musunuri volunteered to deliver a presentation at the January meeting to further highlight some of the communications issues surrounding implementation of LCD schemes using digital relays and digital communications.

H: RELAYING COMMUNICATIONS SUBCOMMITTEE
Chair: V. Skendzic

Vice Chair: Eric Udren

The Subcommittee met on September 15, 2010 with 22 members of 39 total, plus 23 guests. This comprised a quorum. Minutes from the May meeting in Madison were approved.
Seven out of eight NIST-identified Smart Grid standards from PSRC are developed in SC H. Matt Ceglia of IEEE described IEEE Standards Association tools to help WGs complete these projects quickly, including web conferencing facilities.
The SC Chair communicated administrative guidance as reported under Advisory Committee B1.
A discussion of voting procedures brought a clarification of the O&P manual – for standards Working Group votes, decisions require 75% of a Quorum, while document acceptance votes require 75% of the full WG membership. Membership management is essential for successful voting.
Old business:
By unanimous SC vote, The WG H4 project *IEEE C37.111™/ Common Format for Transient Data Exchange (COMTRADE) for Power Systems* , Draft 8.0, is accepted by the SC so that the WG can ask the Main Committee for permission to proceed with IEEE balloting. This draft was unanimously accepted by the WG. This draft, with IEC front matter added by Matt Ceglia of IEEE, is ready for circulation as an IEC Committee Draft (CD) for 60255-24. The goal is to achieve publication of a Dual Logo IEEE-IEC standard. Murty Yalla, Convenor of IEC TC 95 MT4, will notify TC 95 Secretary Serge Volut that the CD is available. This will be discussed at the IEC TC 95 meeting in Seattle in October.
New business:
C37.232-2007 is *Recommended Practice for Naming Time Sequence Data Files*. Since it is not a standard, it is not eligible for IEEE/IEC dual logo status. C37.232 has been gaining popularity and manufacturers in Europe support it. By SC vote of 16 members in favor, a new WG H20 is established to elevate C37.232 to a full Standard. The expert and Chair, Amir Makki, believes this can be achieved with minor editorial tuning and without technical modification. The SC chair requested that Amir find another less experienced person to serve as WG Chair.
The May 2010 minutes described the creation of a pipeline of new Task Force projects – a queue that gives visibility to planned or requested activities, when the PSRC schedule is too full to launch them. This helps with prioritization of new work. It also helps with solicitation of Task Force leadership and membership, and development of scope or assignment. With this advance planning, the TF can become instantly effective when created, and can proceed more briskly into a WG project when the SC supports such an elevation.
One proposed activity in the May 2010 queue of three items has been elevated to WG H20 at the Berkeley meeting. No new activities were proposed at this meeting. The list now comprises:

- Alex Apostolov – Functional testing of IEC 61850 based systems.
- Eric Udren - Object definitions (items of information to communicate) for condition monitoring of protection systems (secondary systems). The objects are intended for incorporation in IEC 61850-7 (or other communications means) to support compliance with a NERC PRC-005-2 or other condition based (failure self-reporting) maintenance program for a protection system. A TF Chair is being solicited with Eric as a supporting technical contributor and guide.

Reports from the WG Chairs

H1: Guide for Power System Protective Relay Applications over Digital Communication Channels
Chair: Marc Benou
Vice Chair: Ilia Voloh
Output: Guide
Assignment: Develop a guide for application of digital communications for protective relaying systems and schemes, including transmitting and receiving equipment, digital channels,

application principals, performance, installation, troubleshooting, testing and maintenance.

The H1 working group met with 5 members and 4 guests. The meeting was chaired by Ilia Voloh as vice chair. The agenda with the IEEE patent policy was also distributed.
The May meeting minutes were distributed but were not approved since a quorum was not present. Draft 2.6 was distributed. Mal Swanson led off the meeting by discussing section 3 "Definitions".
It was then announced that the current PAR will expire in December 2010. Since that is not enough time to finish our review and ballot the guide, the chairman has applied for a two year PAR extension. The status of the guide is that most of it has been written and the WG needs to review the document in earnest. It was urged to the group that while reviewing, to please consider not only editing and content but also to point out if the section discusses the pros and cons of that section and to point out any references or items for the bibliography. Also, to make sure all units are in metric units first and English units as an secondary option.
The following sections were reviewed or in some way modified:

- Section 7.4
- Section 7.5 (need drawings review)
- Sections 7.6-8.
- Section 8 needs drawing (Mal to follow up) and also pilot wire and phase comparison sections need few sentences on how this can be accomplished via digital channels-Mark Simon agreed to write few sentences.
- Section planning is summarizing all channels available but it's not really talking about planning of these channels).

Ken Fodero and Roger Ray were unable to attend and are asked to review sections 4 and 6 respectively to approve the changes that have been made to the sections they authored.
Assignments from previous meeting were not accomplished. The assignments were as follows - we remind it again:

- Section 5, Current section 7.6(to become 7.4.5), and section 8 – Rene Midence
- Sections 3, 4, 6, 7.2-7.2.4, 7.3 – Mike Stojak
- Sections 3, 4, 6 – Sarah Bins
- Sections 5.3, 7.4 – Johan Van den Berg
- Sections 7-7.145, 7.8, 9 – Tom Dahlin
- Sections 7.5, 10.1, 10.2 – Jim Ebrecht
- Sections 7.7, 10 – Mark Simon
- Sections 7.7, 9 – Benou
- Sections 8, 10 – Bob Ince
- Section 9 – Solveig Ward

Anyone else willing to review and not able to attend the meeting is encouraged to do so.

H2: <u>Relay Applications Using the Smart Grid Communications Infrastructure</u>
Chair: M. Simon
Vice Chair: TBD
Output: Report to the Subcommittee on title subject
Assignment: Create a working group report to the Relaying Communications Subcommittee that describes example protective relay applications that can make use of the communication infrastructure provided by the Smart Grid. Protective relay applications will include potential capabilities and the communication requirements necessary to provide suitable communication architectures, services, capabilities, and any other pertinent characteristics.

H2 met on Monday September 13th 2010 with 9 members and 24 quests. This is not a standards effort that requires a quorum. But, we would like to see more members in attendance to achieve a higher level of consensus.
The group reviewed the purpose, outline and applications that will make up the document. The

chairman discussed the contributions since the review of the last draft. Additional sections were added and writing assignments made. Writing assignments were made for the remaining applications with a due date of December 1st, 2010. The completed application list, outline and minutes will be sent out to the mailing list consisting of members and guests.
Anyone that would like to see a copy of the draft, please contact either the chair or vice-chair. The list of writing assignments:
Dynamic Relay Settings based on SG data Mark Simon (Completed)
Reclosing Supervision based on SG data Charles Sufana
CVR: Conservation Voltage Reduction Charles Sufana
Fault Locating Patrick Carroll
Power Quality Data Kevin Donohue (Completed)
Time Galina Antonova (Completed)
Synchrophasors not assigned
GOOSE: Andre Smit
Load Curtailment and Shedding Alex Apostolov
SIPS (System Integrity Protection Schemes) - Wide area or regional coordinated protection using SG communication infrastructure Rene Midence

H3: Timetagging in Protection and Disturbance Recording IEDs
Chair: W. Dickerson
Vice Chair: J. Hackett
Output: Recommended Practice
Assignment: Develop a recommended practice for time tagging of power system protection event, analog, and derived data. This will include methodology for description of measurements and transport delays and for stating the resulting time accuracy.
The WG met on Tuesday September 14, 2010 with 6 members and 10 guests in attendance. We have not had a quorum in quite some time. We plan to ballot approval of the minutes of the three previous meetings (for which approval is pending) by e-mail. The chair and vice chair will review the membership roster before the next meeting. Some members may be changed to Corresponding Member status in view of the difficulty meeting quorum.
Matt Ceglia from IEEE-HQ attended our meeting, and he and Veselin Skendzic, Chair of H Subcommittee explained that our effort has been identified as a “priority activity” by NIST SGIP. IEEE-SA has made available resources to expedite development of these activities.
Four members of the Substations Committee attended our meeting and explained that they have recently created a working group C4, chaired by Marc Lacroix, to deal with IED sequence of events time-tagging requirements. It might be desirable to form a joint working group (e.g., H3/SubC4) with the Substations Committee to further our efforts. (A similar arrangement has worked very well with H7/SubC7 for the IEEE-1588 profile.) We will investigate this prior to the Joint Technical meeting in January with a view towards getting the joint WG approved then, if it is agreeable to all concerned. This would require a new or revised PAR.
The Chair and Vice Chair will distribute existing contributions to date to H3 members and our Substations guests. This is Draft 0.3. Major changes to the outline, format and content are anticipated moving forward. We plan also to act on the request of WG members to circulate the report of the I11 working group, since knowledge of this report and its conclusions is pre-requisite to an adequate understanding of the issues involved. This should lead to more efficient and productive use of the WG members’ time and the limited time available at the PSRC meetings.
We will attempt to clarify our use of these terms, and if possible, seek better alternatives that will minimize confusion to the reader. Tony Napikoski will review the usage of terms in the documents to identify definitions required.
Proposed changes to the Scope, Purpose and Need statements are expected to result in request to revise the PAR.
It is possible that we may want a joint session with SubC4 in January, if the two groups decide to go forward as a joint effort. If not, then it will be best to avoid conflict with this group. We will attempt a timely resolution regarding joining as a single WG.
The relationship between this WG and C37.115 (i.e. what they need from us) needs to be clarified,

since they appear to be putting their PAR on hold pending completion of our effort.

H4: Revision of C37.111 COMTRADE Standard
Chair: R. Das
Vice Chair: A. Makki
Output: Standard
Assignment: Revision of IEEE Std C37.111-1999 - IEEE Standard Common Format for Transient Data Exchange (COMTRADE) for Power Systems.
The WG did not meet in Berkeley. The Standard draft is completed (Draft 8.0). See SC H Old Business for actions towards Dual Logo IEEE-IEC standard (C37.111 and 60255-24).

H5-a: Common Data Format for IED Configuration Data
Chair: J. Holbach
Vice Chair: D. P. Bui
Output: Report
Assignment: Define a common format for IED configuration data.
The working group discussed the latest draft and contributions. It was agreed that standard functions (like 50, 51) used inside the distance function should not be described here but rather only referenced. For example, an overcurrent pickup element is described as an overcurrent protection function. However, if the overcurrent pickup element only supervises the distance relay then it needs to be described. For example, measurement loop overcurrent supervision, or if the overcurrent measurement needs to exceed the supervision setting on 2 phases to enable pickup of the loop distance element.
The Chairman will distribute to each WG member an assignment to describe some of the common settings for a distance relay.

H6 Substation Ethernet
Chair: J. Burger
Vice Chair: C. Sufana
Output: Report
Assignment: Investigate user requirements and provide recommendations for relay peer-to-peer communications in substations. Develop and define practices for the application and testing of IEC 61850 based Ethernet protocol in substation LAN peer-to-peer applications.
Introductions were done after a welcome by Vice Chairman Charles Sufana. There were 6 members and 19 guests present. The minutes from the May 2010 meeting were approved.
Due to scheduling conflicts, there were no presentations. The working group session was spent going around the room to see if anyone had IEC61850 projects or had questions concerning the standard

1. Yuchen Lu of EPRI is doing research on IEC61850 and Smart Grid. They have had some hands-on workshops. Many of the questions they have been hearing are Ethernet based questions. For example, how is the Master Ethernet switch programmed? How should GOOSE be used?
2. There was some discussion that some networks may not be fast enough for GOOSE. The network architecture design is key and the network must be configured properly. Clemens Hoga of Siemens discussed their network design. He pointed out that there are many processes involved between event and the output.
3. There was a short discussion about when the clock starts and stops for performance measurement. The Substations Committee is trying to develop a standard for how to measure the timing. Working groups H3 and C4 are also looking a time-tag guidelines.
4. The working group also had some discussion on cyber security. There is some concern with the 62351 standard in that there is a problem with the 4ms requirement for GOOSE and authentication.
5. Mike Agudo of WAPA explained that they are finding that they need to hard wire the trip circuits. To address cyber security, they have reduced the number of devices on a switch and are using a serial approach. He indicated that the relay techs would rather chase wire.

6. One of the assumed benefits of IEC61850 is the use of standardized designs. Mohammad Zubair of Hydro One explained that they are coming up with a standard design. They build the system up in a lab, test everything, and then put the equipment in the field. He felt that there is a problem due to the lack of available software tools. They also have questions on how do you do maintenance, what is real time, what isn't? They are concerned about the availability of the network and how long is the relay system impacted is a problem. He indicated that they have found it can take about 100 ms to reconfigure if network failed.

For the next meeting several people indicated that they might be able to give a presentation. Steve Thompson, Mohammad Zubair, and Clemens Hoga indicated that they might be able to have something for the January 2011 meeting.

H7 <u>IEEE 1588 Profile for Power System Applications</u>
(Joint Working Group of Substations Committee C7 & PSRC H7)
H7 Chair: Galina Antonova Substations C7 Chair: Tim Tibbals
Vice-Chair: Bill Dickerson
Output: Standard
Assignment: Develop an IEEE Standard "IEEE Standard Profile for Use of IEEE 1588 Precision Time Protocol in Power System Applications" in close coordination with IEC TC57 WG10 and other technical committees with similar interests.
Joint WG H7/Sub C7 met on September 15 in a double session with 44 attendees (21 members and 23 guests). Nine attendees (4 members and 5 guests) called in and participated via on-line meeting.

After introductions, the co-chair presented IEEE Patent Policy slides and asked to bring up any patent issues. None were identified. Minutes of May 2010 meeting were approved electronically. Discussion on PC37.238 Draft 5.4 followed with the following resolutions embedded into Draft 5.5 at the meeting:

- SNMP MIB support is mandatory only for grandmaster-capable devices
- Devices not supporting MIB may report time accuracy
- MIB includes new objects for UTC offset change, VLAN ID / priority and Offset from Master Limit.

Two comments received from IEC were discussed with the following resolution:

- To include End to End Transparent Clocks – was not supported by the WG.
- To exclude industrial SCADA applications – was not supported by the WG.

Craig Preuss moved, René Midence seconded a motion to submit PC37.238 Draft 5.5 for sponsor ballot and request Subcommittee H permission. The motion was approved by 18 out of 24 WG members (75%). Five members were not present; Galina Antonova did not cast her vote. Discussion on next steps and new items followed, including responses to IEC comments, formation of balloting pool (30 days), writing a summary paper, liaison with telecom groups and testing.

H8 <u>Application of COMTRADE for Exchange of Synchrophasor Data</u>
Chair: E. Allen
Vice Chairs: J. Ingleson, K. Narenda
Output: WG Paper
Assignment: Develop a paper on issues related to the use of COMTRADE for exchange of Synchrophasor Data. Develop a profile (scheme) to use COMTRADE for this purpose. Report on other formats that have been used such as ".dst". Address issues that would arise in converting .dst and other formats to COMTRADE.
This WG met on September 13. 4 of 15 Members were present. There was 1 guest, for a total attendance of 5. The Monday afternoon schedule and reported flight delays were apparent causes of the poor attendance

Ken Martin, Benton Vandiver, and Jay Murphy each offered to test the schema by using programs that can read synchrophasor data and output COMTRADE files. Each of the programs is based on the H8 WG Schema. Ken Martin will provide phasor data to Benton and Jay. In turn, Benton, Jay, and Ken will provide COMTRADE files to Eric Allen. Eric will then verify that the three COMTRADE file sets from the three different programs all contain the same numerical data.
Following are status reports on various assignments having to do with the publicizing of this Schema:
An abstract has been submitted to the next Texas A&M Relay Conference. The submittal is being coordinated with Mladen Kezunovic.
An announcement of the schema's development and approval was made before the full conference of the North American SynchroPhasor Initiative (NASPI) on June 8. (Complete)
The GA Tech presentation was given by Jim Hackett. (Complete)
Mark Adamiak presented the schema at the PAC World conference in Dublin in June. (Complete)
Eric Allen will to make a presentation to the Western Protective Relay Conference (WPRC) on October 21.
The following members will work on a paper describing background of this work and current status of testing: Eric Allen, Ken Martin, Mark Adamiak, and Jim Ingleson. This could be submitted to PACworld. (Continued from previous meeting)
The version of the schema approved by H subcommittee on May 13 has been included as an informative annex of the new COMTRADE standard.

H9 <u>Understanding Communications Technology for Protection</u>
Chair: M. Sachdev
Vice Chair: R. Midence
Output: WG Paper
Assignment: Prepare a document that would assist engineers in understanding the communications technology for protective relaying.
The Working Group on September 14. Twelve (12) members and eighteen (18) guests were present. The notes of the previous meeting were presented and discussed.
For the benefit of new participants, René Midence provided an overview of the Report, and presented a list of 48 comments made to Draft 4 distributed after the meeting of May 2010. René advised that due to the nature of the comments, some sections were marked as "Open for Discussion" which meant that they are incomplete, requiring additional information. René requested volunteers to provide contributions to resolve the comments. The working group recommended sending the comments to the group members that submitted contributions for the corresponding sections. René Midence will proceed accordingly.
It was suggested that Acronyms and Glossary be moved to the beginning of the document.
René Midence requested again volunteers to review the document for consistency. Volunteers were identified for this task during the meeting, as follows:

- Lizzette Castro to help organize the references as well adding a section for acronyms.
- It was agreed that expected content for sections 16.5 and 16.7 should be included in the introduction. René Midence to request for contributions.
- Assignments from the meeting in May 2010 that were not received prior to this meeting were identied. René will follow up the corresponding group members.
- Lilliana Vuli will read and provide contributions to the sections marked "Open for Discussion".
- The following members will read the document and provide comments: o Shoukat Khan
  o John Beckwith
  o Sam Sambasivan

- Solveig Ward will provide comments on the sections containing information on SONET

For a more efficient distribution of the working documents, the group suggested to use the PSRC Web Site. René Midence will follow up and will inform the group accordingly. New contributions

and comments are due on November 30, 2010.
It was reported in May, 2010 that the document could be completed after the September 2010 meeting. Based on the comments received prior the September 2010 meeting, the document may be completed after the meeting of January 2011

H10 Naming Installed Intelligent Electronic Devices (IEDs)
Chair: R. Cornelison
Vice Chair: J. Hackett
Secretary: A. Makki
Output: WG Paper Assignment: Create a PSRC Report that describes a convention to uniquely identify (name) installed Intelligent Electronic Devices (IEDs) including measured and calculated quantities for the purpose of sharing data collected by these devices.
The Working Group met on Monday September 13, 2010 with 4 members, no guests.
After discussions, we decided to:

- Rename section 2 "Current Industry Practices" instead of "Best Practices".
- Drop section 2.5 – Identification of Best Practices.
- Stan Klein volunteered to write a short introduction for section 5 and the Conclusion (section 6).

Plans are to get a 'final' draft to the members for discussion in early October, get approval from the WG members in late October, and submit to the Subcommittee in plenty of time for review prior to the January meeting.

H11 C37.118.1 Standard for Synchrophasors for Power Systems
Chair: K. Martin
Vice Chair: B. Kasztenny
Output: Standard
Assignment: Create a new Synchrophasor Standard C37.118.1, using the measurement portion of the current standard, C37.118-2005, and adding dynamic phasor measurement and frequency measurement requirements according to the PAR issued 17 June 2010.
WG H11 met on Tuesday, Sept 14, 2010 in a double session with 11 members and 19 guests. The participants were reminded of the applicable IEEE intellectual property rules. The May meeting minutes will be approved electronically.
Ken Martin gave a brief overview of the split of the 37.118 activities including the split of the WG into two groups *[the other now commissioned as H19]* and their progress. He also gave a tour of the current draft of V1.1 of the new standard PC37.118.1. The group then began technical discussions.
The first issue was latency. Allen proposed that the current method be broken two components: a time delay based on a step test and a reporting delay. This was discussed at some length as to what it means and what it should measure. In the end it was decided that we need to add a step test delay measurement requirement in the dynamic step test section and add a simple reporting latency test taken as an average over a number of samples, since this measurement is somewhat random.
Should we keep annex B? Yes, it is useful; integrate the magnitude step test example (called section B.3). Retention of the section B.3 on measurement errors due to changing frequency was discussed. It is covered by the new sections on measurement requirements. By vote of 7 out of a quorum of 11, it will be removed.
The use and relevance of annex D was discussed. It probably should become a part of a different standard dealing with timing issues. For now, since it has been referenced by a number of other implementations and the information in not carried elsewhere, it should remain in this standard.
Do we need complete test algorithm formulas in the annex C? Consensus was that full implementation details are required so that any practitioner can come up with exactly the same answers that the WG did. Bill Dickerson will see if he can come up with the same results that G. Benmouyal did using the current description. Veselin and Ken will improve the order and contents of the annex.

The issue of use of measurement CT devices with a more limited range than the 10-200% specified for the PMU was discussed. The conclusion was that while most instrumentation is specified in terms of maximum input, CT/PT circuits are typically specified in terms of a nominal and expected to operate somewhat over that nominal. Since many PMUs will be used for situations where we could get a power swing that goes way over nominal, the WG decided that operation to 200% seems like a good number to work with. The specification was left as is.
Jon Beckwith, Tarlochan Sidhu, Miroslav Begovic, and Yuchen Lu volunteered to read and provide some comments on the current draft. A draft with the changes made during the meeting will be sent to them.

H12: <u>Configuring Ethernet Communications Equipment for Substation Protection and Control Applications</u>
Chair: E.A. Udren
Vice Chair: J. Gould
Output: WG Report
Assignment: Develop a report to assist protection engineers in configuring Ethernet LANs and networking equipment when the network traffic includes critical protection messaging such as IEC 61850 GOOSE messaging. Topics include switch and router configuration, VLANs, security, priority queuing, traffic monitoring and control, and topology choices and redundancy.
The Working Group met on September 15 with 4 members and 6 guests. Attendees reviewed Draft 9 of the WG paper, with new additions and editing. The draft has a full body of material with a few identified spots to fill in. The WG reviewed the draft and identified remaining assignments, to be handled by volunteers in attendance and via prior assignments. Draft 9 is circulated after the meeting for WG review and these additions in October.
Report work topics:

- Items still missing as identified in Draft 9.
- IPv4 versus IPv6 words – Supplied by Herb Falk right after the meeting.
- IEEE 1588 impact, advantages and disadvantages.
- Ask Ken Martin for words on synchrophasors over Ethernet.
- Siemens' Layer 3 failover, and ABB and SEL switched dual port interfaces for bumpless recovery from failure – Joe Gould, Lars Frisk.
- Ethernet switches within relays and IEDs – Fernando Calero, SEL - Fixed port, failover port, looped daisy chain in another figure – easier to run network media.
- See IEC 61850-8-1 Edition 2 draft – points to IEC 62439-3 on redundancy.

H13 <u>Understanding Requirements and Applications of the Substation Cyber Security Standards</u> (Joint Working Group Substations Committee C1 & PSRC H13)
Chair H13: Steven Kunsman Chair C1: Sam Sciacca
Vice Chair H13: Tuan Tran
Output: Standard
Assignment: Prepare a standard on "Cyber Security Requirements for Substation Automation, Protection and Control Systems." This document provides technical requirements for substation cyber security. It presents sound engineering practices that can be applied to achieve high levels of cyber security of automation, protection and control systems independent of voltage level or criticality of cyber assets. Cyber security includes trust and assurance of data in motion, data at rest and incident response.
The WG H13 and substations WG C10 meeting was held on Wednesday, Sep. 15th with 36 attendees, 19 members and 17 guests. No quorum was established in the first session so the minutes will have to be approved via email. The group also went over the IEEE patent slides.
Craig Preuss gave an update of the current status of the P1711 working group. He stated that their document is going for ballot at this time.
Stan Klein shortly mentioned about the progress of the IEC 62351 working group. Markus Braendle will send a presentation on encryption of GOOSE messages and their inherent time delay. The presentation will be included in the minutes.

Sam Sciacca gave an update of the working group P2030 current progress. Their next meeting will be held in Las Vegas.
Stan Klein updated the group on NISTR 7628 status and that this is a new version available. This version can be found at www.nist.gov/smartgrid
The working group chairman once again re-affirmed the need to have an IEEE cyber security standard for Substation Automation. Everyone again agreed that the standard will help the utilities of how to implement their systems to be compliance with NERC CIP.
Craig Preuss proposed that the working group standard should be made so that vendors will be able to implement the standard.
First priority for the officers is to complete the PAR submission before September 24th.
Bernard Tatera presented to the group PG&E's "Facilitating NERC CIP compliance with Secure Centralized server communications". The presentation will also be included with the minutes.
Assignments have been handed out to the working group:

- Section 6.3.2: Steve Thompson
- Section 6.3.2.4: Steve Thompson
- Section 6.4.1: Roger Ray
- Section 5.1: Mark Simon
- Section 6.5: Mike Dood
- Section 7: Stan Klein

The assignments are due by the end of November this year. The writing assignments can be sent to Tuan Tran, tatran@tva.gov.

H14 Revision of C37.115 Message Communications Between IEDs
Chair: J.T. Tengdin
Vice Chair: TBD
Output: Standard
Assignment: Recommend whether C37.115 is to be revised or retired.
H14 did not meet in Berkeley. After consultation in members of the H14 WG and Matt Ceglia of IEEE SA Staff, it was decided that C37.115 should be placed in an inactive status until the elapsed times (T1, T2, and T3) now in that standard's Figure 1 can be measured. A Working Group of the PES Substations Committee's C Subcommittee is beginning work on a method to measure these times (or their equivalent). Thus, a PAR has been submitted to IEEE-SA (and it is on the October RevCom agenda) to withdraw IEEE C37.115 from Active status. Until a valid measurement method is defined, IEEE C37.115 will remain as Inactive.
H15 Coupling Redundancy for Protection Systems Using Power Line Carrier
Chair: R. Ray
Vice Chair: TBD
Output: Paper
Assignment: To develop a working group report that discusses the various coupling schemes for power-line-carrier systems and the coupling schemes ability to provide for redundancy.
H15 did not meet at the September 2010 meeting.
Roger is to review one figure for technical correctness and get it out to the WG for a vote, then to the Subcommittee for approval - expected by January.
H16 Common Format for Event Data Exchange (ComFEDE)
Chair: M. Adamiak
Vice Chair: P. Martin
Output: Standard
Assignment: Define a standard for a common format for the data files needed for the exchange of various types of power network events.
There was no meeting in Berkeley. In May, the SC voted to elevate C37.239 ComFEDE to a full Standard to support utilization in Smart Grid standards – the full Standard has now been approved by IEEE SA RevCom. In January 2011, work will resume on a summary paper and presentation.
H17 Establishing links between COMTRADE, IEC 61850 and CIM
Chair: C. Brunner

Vice Chair: A. Apostolov
Assignment: Develop a standards approach to link IEC 61850, CIM and COMTRADE so that the COMTRADE channels can be associated to a node in the power network.
The meeting was held Tuesday morning as a double session and attended by 12 members and 11 guests.
After introduction of attendees CB made a very short introduction of the scope of the working group and of IEC 61850 LN and their use in system wide applications such as disturbance recording and synchrophasors.
This was followed by a presentation by Herb Falk on CIM basics and the relationship between CIM and IEC 61850.
The WG then reviewed the outline prepared during the May Meeting in Madison and agreed to it as a starting point. This was followed by a brainstorming on different use cases that shall be discussed in the report.
It was discussed that there may exist some usage of COMTRADE as a data exchange format for real time purpose but it was decided to focus on use cases where COMTRADE is used for event driven records. A first list of use cases was collected.
The principle use case is the post event analysis either of events affecting only one location or of events that require the correlation of information from several geographically dispersed locations.
As an assignment, Tim Tibbals will prepare a narrative of that use case from the perspective of a protection engineer.
The other assignments from the May meeting are still open.

H18: Cyber Security for Protection Related Data Files
Chair: Amir Makki
Vice Chair: Stephen Thompson
Output: Report
Assignment: Develop a report on security for data files used for configuration, management, and analysis of protective relaying systems.
The H18 working group met on Sept 15th, 2010 with11 members and 17 guests present.
Introductions were made. A brainstorming to generate a list of types of protection related data files was carried out which produced a variety of file types but which was then trimmed down to a list of 8 broad file types. The group then considered issues such as risk/consequences of file modification or deletion and types of security appropriate for each file type. These ideas will be contained in the report in the form of a matrix to relate file types against risks/consequences and mitigations. Risks will be categorized into different areas, such as Confidentiality, Integrity etc. and the probability of each will be scored as High, Medium or Low.
Writing assignments were distributed for contributors, each to concentrate on a specific file type to produce information on File Description, Risks & Consequences and Recommended Action (mitigation). These will form the basis of the report matrix.

H19 C37.118.2 Standard for Synchrophasor Data Transfer for Power Systems
Chair: Ken E. Martin
Vice Chair: Gustavo Brunello
Scope: This standard defines a method for exchange of synchronized phasor measurement data between power system equipment. It specifies messaging including types, use, contents, and data formats for real-time communication between Phasor Measurement Units (PMU), Phasor Data Concentrators (PDC), and other applications.
NOTE: This group met as HTF3 at prior meetings.
The working Group met in 2 sessions: 1) Tuesday, September 14 and 2) Wednesday, September 15, 2010 with no quorum. Two people became new members.
A new draft of the Standard was circulated and discussed. A proposal for addition of new Commands and a Configuration frame was discussed in detail. A motion by a WG member not to introduce any modification to the existing Synchrophasor data format could not be voted due to the lack of quorum. Discussions are to continue during the next meeting in Atlanta.
Herb Falk made a presentation about the IEC 61850-90-5 Technical Report being circulated for comments by the IEC.

Liaison Reports

PES Substations Committee
C. Preuss
See Main Committee Report of Interest.
PES Communications Committee
S. Klein
No report.
IEC TC57, WG10, 17, 18 and 19
C. Brunner
IEC TC57 / WG10 is currently working on the following topics:
(1) Preparation of Edition 2 of IEC 61850:

The parts 4, 6, 7-2, 7-3, 7-4 and 8-1 are published or circulated / ready for circulation as FDIS. From a technical viewpoint, they are done.
Parts 7-1 and 9-2 are in final review by the WG.
A first draft of Part 1 will be circulated for comments within the next weeks. The same is planned for Parts 3 and 5.
(2) There are different task forces working on preparing technical reports: a. IEC 61850-90-3 – using IEC 61850 for condition monitoring
b. IEC 61850-90-4 – network engineering guidelines
c. IEC 61850-90-5 – using IEC 61850 to transmit synchrophasor data according to IEEE C37.118.1. This is a joint work with IEEE PSRC HTF3 [now H19].
d. Modelling of logic
e. Functional testing

For IEC 61850-90-5, a draft is currently being circulated to the national committees; comments are due by October 1, 2010.
(3) Discussion of a web based publication of the models (basically parts 7-3, 7-4xx) by IEC is ongoing. In addition to that, a task force is working on an approach to model IEC 61850 in UML.
IEC TC57 / WG17 is working on extending the models for distributed energy resources in particular adding photovoltaics. A task force was created that shall prepare a technical report about the use of IEC 61850 for Distribution Automation.
IEC TC57 / WG18 is preparing IEC 61850-7-510: use of the logical nodes defined in IEC 61850-7-410 to model applications for the control of hydro power plants. WG 18 also prepared a CD of the second Edition of IEC 61850-7-410. That work is focused on refining the different details of the logical nodes based on experience with first implementation considerations.

I: RELAYING PRACTICES SUBCOMMITTEE
Chair: R. Beresh
Vice Chair: J. Pond
The I Subcommittee met on September 15, 2010 with 24 members and 19 guests present – a quorum was achieved.
• Approved minutes of I SC meeting held in Madison, WI in May, 2010.
• The importance of identifying one's affiliation as well as employer was mentioned as an important aspect of transparency in the standards process
• The importance and definition of quorums in the WG was emphasized

Reports from the WG Chairs

I2: C37.100 - Terminology Review
Chair: Mal Swanson
Vice Chair: Fred Friend

Output: Definitions for C37.100 and IEEE Std. 100

Assignment: Review drafts of PSRC publications for proper terminology, abbreviations and symbols; and to recommend additions and changes to the IEEE database as appropriate.

The I2 working group, chaired by Mal Swanson, met on Monday, September 13, 2010 with 7 members and 1 guest present, including one new member - Lilliana Vulic.

Minutes from the May meeting in Madison were reviewed and approved.

Liaisons have been assigned for all working groups with a PAR to facilitate the development of new terms during the working group process. Reports were given on the status of each.

Words from approved Standards and Guides with a Section 3 (Definitions) have been incorporated into the IEEE database. An alphabetical listing of the words not in the database, but useful to the PSRC have been posted on the web site under "TERMS" link.

I3: <u>Relay Functional Type Testing</u>
Chair: Jerry Jodice
Vice Chair: Bryan Gwyn
Output: Report
Completion Date: September 2011

Assignment: "A series of functional tests that could show a particular problem related to system events. Individual problems will be submitted by members of the Working Group and a test report developed for that issue. The individual test reports will then be collated into a Working Group report

I3 met Monday with three members and three guests attending,.
Draft 5 had been distributed last week courtesy of Amir Makki, with the request that contributors review their sections and provide comments of note.

Summary of Activities:
1. Contributions were reviewed briefly ,and errors noted by TW Cease, Jeff Pond and Jerry Jodice. Steve Turner and Jeff Pond will add SC models as examples of how they created their test plans.
These errors of omission will be documented by TW, and the contributors requested to complete their sections by the Chair.

2. To complete the Introduction, either a summary of ,or the original NPCC letter to Bryan Gwynn[which was the genesis of the WG] should be included...

3. Corrections to the draft , integration of the contribution by Bob Beresh [an oversite] ,and the Introductions will be added by Amir Makki for distribution to contributors for comments by the end of November ,in order to complete the assignment & Report ,for the January 2011 meeting.

4, The IEEE and CIGRE reference documents will be incorporated within the body of the Report since they are no longer available.
.
5, One final request will be made to those who offered contributions but have not yet made their submissions. Should there be no further contributions the Report is expected to be available for submission to the I SC in January with the existing case studies.

I4: IEC Advisory Working Group
Chair: E.A. Udren
Vice Chair: M. Ranieri
Output: Comments and votes to USNC of IEC on TC 95 (Measuring Relays) Standards projects and drafts. Reports to PSRC on IEC standards development.
Meeting: WG meetings are continuing

Assignment: Develop comments and votes for USNC of IEC on TC 95 (Measuring Relays) Standards projects and drafts. Report to PSRC on IEC standards development. WG meetings are continuing.

The WG met on September 14, 2010 with 6 attendees and discussed recent TC 95 documents: 95/262/DC - Proposed TC 95 Business Plan – to be discussed at IEC TC 95 plenary meeting in Seattle on October 14. Written comments from USNC are due to IEC by October 1. This plan contains notable items:
TC 95 plans another reorganization and turnover of the relay electrical environment standards. 60255-26, now a succinct and useful relay EMC requirements summary, is to be rewritten to serve as the sole specific description of how to apply referenced generic environmental test standards from the 61000-4 series. TC 95 had developed 60255-22 environmental test standards, which are now to be eliminated. Necessarily, a lot of requirements and testing procedures in these documents will have to be absorbed in the new 60255-26 – it may no longer just be an overview.
TC 95 plans to develop application guides, along with expanding its offering of functional standards.
TC 95 is looking at standards for Smart Grid functions, protection of circuits with DER, and interfacing of electronic instrument transformers to relays.
The WG discussed comments on the plan for submission to TC 95 by October 1, in advance of the Seattle meeting. The full comments have been circulated to the WG, and are available from the Chair. Included in the comments is a proposal for liaison relationship between PSRC and TC 95, along with specific *ad hoc* relationships of PSRC WGs and IEC Maintenance Teams working on standards. The PSRC Chair suggested that the I4 Chair handle the overall liaison relationship pending development of specific working arrangements.

I5 Schematic Representation of Power System Relaying
Chair: Kevin Donahoe
Vice Chair: Rich Young
Output: Report
Expected completion date: TBD
Assignment: Report on common practices in the representation of protection and control relaying. The report will identify methodology behind these practices. Present issues raised by the integration of microprocessor relays and the internal logic and external communication configurations. Detail approaches to these issues.

The Working Group met at 0800 on Wednesday, September 15, 2010 in Berkeley, CA in a single session with 13 members and 4 guests attending. Mike Agudo and Greg Sessler were added as members.

Chair Kevin Donahoe could not attend and Vice Chair Rich Young opened the meeting by welcoming attendees. Introductions were given. The Working Group is reminded that, although this WG will not be producing a standard, proprietary information may be shared during the course of our work, so it is important to keep the Standards Board Bylaws on Patents in Standards in mind.

Writing assignments submitted since the previous meeting have been included in the latest draft of the report, which is posted on the Working Group I5 web page. Missing assignments were

noted and a request was made to submit them by December 15 to Kevin and Rich.

The Working Group assignment was reviewed to provide guidance for keeping existing and future writing assignments on topic.

Two writing assignments, received too late to be included in the draft, were discussed:

The WG reviewed Jim Niemira's submittal, an overview of drawing types. The WG felt that the section should make it clear that the single-line diagram is the primary reference document for the electrical design basis of the substation. It was also felt that the paragraph on logic diagrams seemed to be too detailed and specific for an overview section, since there is a more detailed section on logic diagrams later in the report. Craig McClure volunteered to work on this. The section mentions a number of drawing types that are needed for constructing a substation, but not necessarily pertinent to protection. It should be made clear that these are listed for information only, and will not be discussed further in the report.

The WG reviewed Jeff Long's submittal on the integration of open-architecture relay-to-relay communication (IEC 61850), which does not lend itself easily to traditional contact ladder diagrams, but it is important that it be clearly documented. The report will include various methods of showing this concept.

Writing assignments, still to be provided:

1. Section IV. – AC Schematics – how they are impacted by microprocessor relays. (John Appleyard).
2. Section VII.A. Communications (Craig Preuss. Mike Agudo and Adi Mulawarman will assist Craig with this.)
3. Section VII.B – SCADA (or local client to remote client communication). (Craig Preuss).
4. Section VII.D. – Tabular Database/Spreadsheet (Tony Seegers. Greg Sessler will assist Tony with this.)
5. Section VII.E – Discussion of the importance of documentation to aid testing (Karl Zimmerman).
6. Section VIII. – Conclusion (to be determined.)
7. Section IX. – References (to be dertermined.)

For reference by members and guests, the draft document, minutes, writing assignments, and presentations are posted on the WG I5 web page.

We plan to incorporate the remaining writing assignments before the January meeting and begin editing the overall document. Members are asked to review the draft and propose any modifications. Anyone who has some additional examples of documentation that might be appropriate to include in the report are asked to notify Kevin and Rich.

For the January, 2011 meeting we request a room for 25 people, and computer projector.

I6: <u>Practical Aspects of Rogowski Coil Applications to Relaying</u>
Chair: Ljubomir Kojovic
Vice Chair: Bob Beresh
Output: Special Report to the PSRC
Date: 13 January, 2010

Assignment: Produce a special report describing applications of Rogowski Coils used for protective relaying in electric power systems

The WG met to discuss the final draft of the report. Lubo will finalize any last minute changes and present the report to the SC for approval.

I8: Revision of C57.13.3 - Guide for Grounding of Instrument Transformer Secondary Circuits and Cases
Chair: Brian Mugalian
Vice-Chair: Bruce Magruder
Established: 2009
Output: Revision of IEEE/ANSI C57.13.3-2005
Expected Completion Date: 2012

Assignment: Revision of C57.13.3 - Guide for Grounding of Instrument Transformer Secondary Circuits and Cases

Working Group I8, Revision of C57.13.3 - Guide for Grounding of Instrument Transformer Secondary Circuits and Cases, was held in Belvedere Island, Doubletree Hotel and Executive Meeting Center, Berkeley CA on September 15, 2010. Eleven members and five guests were present.
The spreadsheet of pertinent IEC standards was reviewed, and five volunteers will review the remaining standards. Deadline for comments is October 15. The spreadsheet and other documents including the existing Guide will be placed on the secured I8 web site for working group members to use.
Bruce Pickett and Gary Kobet gave presentations on topics that will be added to the Guide. Bruce's presentation material will be placed into the appropriate sections of the Guide. Gary's presentation will be placed as an Informative Annex in the Guide, to describe two field issues related to how equipment is grounded, showing the problem and the solution. Brian Mugalian and Bruce Magruder will begin work on a first draft of the Guide for review at the January 2011 meeting.
The Working Group will meet in January 2011 in Atlanta, GA. We will require a room for 15 people and a computer projector.

I9: Revision of C37.105 Standard for Qualifying Class 1E Protective Relays and Auxiliaries for Nuclear Power Generating Stations
Chair: Sahib Usman
Vice Chair: Roy Ball
Output: Revision of Standard C37.105

Assignment: Review the applicability of the standard for all relays used in nuclear power plants, specifically digital relays and seismic qualification of the relays. Update the standard in conformance with the latest IEEE Style Manual, and incorporate field experience and state of the art developments.

No report – the work is ongoing

I10: Revision of C37.98 Standard for Seismic Testing of Relays
Chair: Marie Nemier
Vice Chair: Munnu Bajpai
Suresh Channarasappa – Co –Chair SC-2
Output: Revision of Standard C37.98

Assignment: Revise and update C37.98

No report – the work is ongoing. A review of the terminology will be conducted and the draft revised if necessary.

I11: PC37.241 - Guide for Application of Optical Current Transformers for Protective Relaying
Chair: Harland Gilleland
Vice Chair: Bruce Pickett
Established: March 25, 2010
Output: Guide PAR PC37.241 March 25, 2010
Expected Completion Date: December 31, 2014
Assignment: Develop Guide for "Application of Optical Instrument Transformers for Protective Relaying"

The meeting was opened with a welcome and introduction of attendees, a discussion of the agenda, and then focused on WG topics of interest. There was also a review of the IEEE Copyright slides and identification of the website locations. There were 10 members and one guest.
There was then a detailed discussion of the Review and Consolidation Process that the Working Group is following for the sections in the Guide. There are 11 (eleven) individual Sections that will be combined into a single document. The target for the first draft for the combined document is by the end of this year.
In the meeting seven (#7) Team Leaders led an in-depth discussion on the status and action plans for their specific Section. Details of these discussions will be included in the WG I-11 detailed minutes. Three additional Sections are now ready to be posted on the WG web-site. Four additional Sections should be ready for posting shortly.
Other topics of interest included:

- Bruce Pickett reviewed information from Jeff Gilbert on the IEEE Style Guide template that will be used for the Guide.
- There was also discussion regarding the process for using the WG Web site – with Michael Mendik as the web master.
- Brian Mugalian reviewed the need to meet the requirements for the PSRC WG I2 Dictionary

Need for Next Meeting: 30 people and CP

I16: Harmonizing of CT Standards within the PSRC

Chair: George Moskos (designate)
Vice Chair: Brian Mugalian
Output: Report
Expected Completion Date: 2011

Assignment: Write a PSRC Report which serves as a summary paper for the three previously active CT Standards C57-13.1, C57-13.3 and C37.110.

The working group did not meet at this meeting. Prior to the meeting, a discussion was held with various working group members to discuss the material available for the report. It was decided that there was not enough material present to write a paper on the harmonizing of the three CT Standards C57-13.1, C57-13.3 and C37.110. This position was presented at the "I" Subcommittee meeting. A motion was presented to disband WG-I16. This motion was approved.
A motion was passed and approved to disband I16.

I17: Trends in Protective Relaying Performance
Chair: Mark Carpenter
Vice Chair:
Output: Periodic Reports to Subcommittee

The WG did not meet

I18 Anomaly Checks for Relay Settings
Chair: Peter McLaren
Vice Chair: Mukesh Nagpal
Output: Report to main committee

Assignment - "The WG will produce a report on relay software features and setting practices which minimize the possibility of wrong settings being downloaded to a relay. The WG will commence its task by conducting a survey of relay manufacturers and utilities to get information on present practice."

Mukesh acted as chairman in the absence of Peter.
This was a brief meeting that lasted approximately 15 minutes.

1. There was not enough working group members present to form a quorum so the minutes from the previous meeting could not be accepted. This will be done via email instead.
2. The working group is in the process of the final review.
3. The report is complete except for the inclusion of working group C3.
4. The meeting was adjourned.

The WG will meet for a single session at the next meeting, 20 people and we need a CP.

I20: Revision of C37.90.1 - IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
Chair: Tom Beckwith
Vice Chair: Jeff Burnworth
Output: Revision of C37.90.1 SWC Tests Standard
Assignment: To revise IEEE Std C37.90.1TM-2002
Expected Completion Date: September, 2010 (ready for ballot)

The tenth meeting of the Working Group (WG) I20 met on September 14, 2010, in a single session with 9 members and 3 guests. The meeting was chaired by Jeff Burnworth.

The chair showed the slides of the Highlights of the IEEE-SA Standards Board Bylaws on Patents in Standards.

The minutes of meeting #9 in Madison, WI, in May 2010 were approved as submitted.

The Working Group discussed comments to draft 4.2 that were provided by Jack Chadwick. After much discussion on sections 5.1 and 5.2, it was concluded that these sections are redundant, repeat information contained elsewhere in the standard, and that these sections will be removed from the standard.

Section 5.3 was discussed. The discussion was initially focused on the need to specify the test generator's internal dc blocking capacitor value. The value specified differed from that identified in the associated IEC standard. It was concluded that this capacitor was not specified in the original approved standard, and that the standard should not define internal generator components. The standard must specify the test waveform and generator characteristics, and not the internal design of the generator. After further discussion, it was concluded that section 5.3 can also be removed, but a review of sections 5.4 and the annex must be performed to assure that all necessary generator and waveform characteristics are identified. Mario Ranieri and Mark Simon volunteered to perform this review. This review will be completed by November 1st.

The Working Group reviewed Annex E IEEE - IEC Comparison Tables and determined that the

latest IEC and the latest harmonized IEEE characteristics are correctly and clearly included in the table and made improvements that would make it easier to follow. Main clauses were cited that the Working Group elected not to harmonize with justification as to why. In every case this resulted in the IEEE clause being equal to or more stringent than the equivalent IEC clause.

These last changes will be incorporated and be distributed as Draft 5 to the working group by November 15, requesting consensus to go for balloting. After receiving consensus from the WG, the draft will be sent to the Subcommittee chair for approval to go for balloting.

Requirement for the next meeting: Single Session for 25 people with a computer projector.

ITF1 <u>Manufacturer's Service Letter Database</u>
Chair: Jerry Jodice
Vice Chair:
Output: Service Letter Database

Three members and one guest were in attendance. Summary of Activities:

1. There have been no advisories received since the last meeting.

2. A number of Manufacturers of protection devices were approached requesting contributions to the DB. There is no interest in promulgating advisory information for public use.

3. The following is excerpted from the January 2010 I TF #1 Minutes:

.Should there be little or no participation, I suggest the following:
*** At the September 2010 meeting, request ISC to disband I TF #1 retaining the existing database..*

***Remove the existing historical database from Doble's site.*

***Provide a copy of the existing historical database to Russ Patterson for inclusion on the PSRC site, insuring the availability of this valuable information on electromechanical relays.*

***In conclusion, I believe the value of historical information on electromechanical relays cannot be overstated, since the vast majority of protection depends on their reliable service.*

Jeff Pond has offered to scan a collection of advisories and provide them for inclusion on the PSRC site, as time permits. The original spread sheet version of the advisories will be used as reference to minimize duplication.

A motion was passed and approved to disband ITF1.

ITF2: <u>Promotion of Dual Logo of C37.2</u>
Chair: John Tengdin
Vice Chair: TBD
Output: TBD

The TF did not meet.

ITF3: <u>Reaffirmation of C37.103, Guide for Differential and Polarizing Relay Circuit Testing</u>
Chair: Mohindar Sachdev
Vice Chair:

Output: Recommendation to the PSRC

The reaffirmation ballot will be circulated within the next few weeks. A TF will be formed, beginning at the Jan 2011 meeting, to start the process of revising the standard.

ITF5: Reaffirmation of C37.92 - Analog Inputs to Protective Relays from Electronic Voltage and Current Transducers
Chair: Roger Whittaker
Vice Chair:
Output: Reaffirmation

The TF will begin the process of reaffirming C37.92 - 2 "Analog Inputs to Protective Relays from Electronic Voltage and Current Transducers". Roger Whittaker has been approved as chair for this TF.

ITF10: Reaffirmation of C37.90 Standard for Relays and Relay Systems Associated with Electrical Power Apparatus.
Chair: Mario Ranieri
Vice Chair:
Output: Recommendation to the PSRC

No Report

Liaison Reports
None

Coordination Reports
None

Old Business
None

New Business

1. There was a discussion about negative ballots. Drafting teams are required to respond to comments but, are not required to resolve negative comments before recirculation. However, it is recommended that a negative ballot be resolved before recirculation.

J: ROTATING MACHINERY PROTECTION SUBCOMMITTEE
Chair: K.A. Stephan
Vice Chair: M. Yalla

Scope: Evaluate and report on protective relaying concepts and practices applicable to generators, motors, synchronous condensers, associated auxiliary systems, and performance of plant protective systems. Develop and maintain related relaying standards.

The Subcommittee met on Wednesday, September 15, 2010 with 18 members (achieving quorum) and 11 guests. There was a call for the approval of the minutes of the May 2010 meeting in Madison, WI. These minutes were approved by the subcommittee members with minor corrections: J3, Mike Thompson was not assigned to review the 27 function.

Reports from the WG Chairs

J1: Adjustable Speed Drive Motor Protection Application and Issues.
Chair: J. Gardell
Vice Chair: P. Kumar
Established: 2003
Output: Report to the Subcommittee

Expected Completion: Dec 2008
Status: Draft 8 (Final)

Assignment: Investigate and report to the Subcommittee motor protection issues related to motors utilizing variable speed (frequency) drives.

The Working Group did not meet at this meeting. The report is published on the PSRC website. The Working Group is writing an IEEE Transactions paper based on the report. Tom Farr is the Editor of this Transactions paper. Tom will complete and send to Jon Gardell a final draft for review by the Working Group members by November 15, 2010. Jon will send this document out to the Working Group membership for review and comment. Any comments are due back to Jon by December 15, 2010.

If necessary, a Working Group meeting will be scheduled for the J1 Working group in January in Atlanta to discuss and resolve the received substantive comments. The paper should be complete by the end of January 2011.

J2: Protection Considerations for Combustion Gas Turbine Static Starting
Chair: Mike Reichard
Vice Chair: Zeeky Bukhala
Established: 2005
Output: Report to the Subcommittee
Expected Completion: 2009
Status: Draft 2b (Final)

Assignment: Deliver a paper or report on special protection requirements on generators employing load commutating inverter (LCI) static starting.

The Working group did not meet at this meeting.
The report will soon be published on the PSRC website. Dale Finney volunteered to format the report into an IEEE transactions paper.

J3: Power Plant and Transmission System Protection Coordination
Chair: Jon Gardell
Vice Chair: Phil Waudby
Established: 2010
Output: TBD
Expected Completion: TBD
Status: 2nd Meeting

Assignment: The J3 assignment is under development and was discussed this meeting. See below.

The second Working Group (WG) meeting was held on September 14, 2010 with 17 members and 22 guests. Jim O'Brien, Matt Basler and Sungsoo Kim joined the WG. The meeting was a single session.
Jon Gardell led a WG discussion of the assignment. Due to comments received as part of working group assignments, the first part of the assignment was modified to include two additional standards, C37.91 and C37.96 and will now read:
"The J3 Working Group is to provide a report containing recommendations to the J Subcommittee on coordination issues and other relevant matters gleaned from the NERC Technical Reference Document - Power Plant and Transmission System Protection Coordination to be used as a feeder material and technical additions for consideration in the next revisions of C37.91, C37.96, 101, C37.102, and C37.106."
A discussion on establishing a liaison with NERC was tabled, pending discussions at the

Subcommittee and Officer level.
Phil Tatro gave an update on the NERC Power Plant and Transmission System Protection Coordination Technical Reference Document revision. He stated that the revision primarily concerned phase distance protection, voltage restraint overcurrent protection and changes to obtain more consistency in terms. Phil said the revised document is on the NERC web site. http://www.nerc.com/filez/spctf.html. Scroll down to "Protection System Coordination". According to Phil, feedback from the industry will continue to be used to modify the NERC document. At present there is no formal review cycle for these types of documents, but this is a current discussion at NERC.
The balance of the WG assignments was made as follows:
21 – Michael Thompson / Meyer Kao
32 – Steve Conrad
46 – Dale Finney / Dale Fredrickson
50/27 – Rich Young
50BF – Ron Grant / Bob Pettigrew
51T/51TG – Mike Reichard / Prem Kumar
51V – Mohamed Abdel Khalek / Mike Jensen
59 – Jim O'Brien
59GN/27TN – Russ Patterson
81 O/U – Gary Kobet / Zeb Fettig
87 – Matt Basler
Jon Gardell will send out a template for the review comments, so that there is consistency in the comment format. Jon will also contact IEEE for permission to post the current revisions of C37.91, C37.96, 101, C37.102, and C37.106 on the WG web page. Passwords will be used to limit access to those individuals working on assignments.
Jon Gardell has intiated contact Mike Basler – IEEE Excitation Subcommittee Chairman to see if they would be interested in establishing Coordination with the Working Group. This would benefit future revision of the Guides addressing the generators. This topic was discussed during the J Subcommittee meeting, last meeting in Madison, WI.
The assignments are due December 15, 2010.

J6: <u>Protection issues Related to Pumped Storage Hydro Units</u>
Chair: Joe Uchiyama
Vice Chair: Robert Frye
Established: 2009
Output: Transactions Paper
Expected Completion: TBD
Status: Fourth Meeting

Assignment: To review and summarize the trends of the last thirty-five (35) years of Pump Storage unit protection since PSRC presented the summary report in May/June 1975. The WG review is focused on: (1) Old protection/control, (2) New protection/control, (3) New experiences during protection rehabilitation and (3) any significant issues/concerns. Evaluate and report on protective relaying concepts and practices applicable to a combination of generator and motor, associated auxiliary systems, and performance of plant protective systems. Summarize the trend of Pump-Storage motor and generator protection for last thirty-five (35) years of industrial practices.

The WG met the morning of September 14, 2010 with 16 attendees (7 Members and 9 guests). The Chairman opened the meeting with the "Introductions" and explained a brief history of this WG, and distributed the meeting agenda and Draft Survey Form.
The original paper was based on E/M discrete relays for the protection on pumped storage units. Chairman pointed out that this transaction paper was published in 1975 (35 years ago) with the discrete relays, it required phase swapping between generation and motor modes. Modern micro-processor relays, which are capable to do the phase swapping internally, have been applied to

pumped storage units. It would be of interest to see a report covering the trend of unit protection in the form of comparing old and new protection technologies for the last 35-years.
Attendees had reviewed the draft Survey Form, and brought up the following items in need of work:

(1) A question about the location of phase shifting switch and VTs and CTs.

(2) A couple of typical single line diagrams the significant examples that survey responders can choose from that best represent their system.

(3) External inputs to the digital relays that can trip the unit via over-speed, over-temperature (RTD), thermocouples, etc.

(4) A question of any protection issues during rehabilitation

(5) A list of utility contact person/survey responder for each pump storage unit.

(6) A question regarding how to resolve the issues associated with switching CTs

(7) Considering including the pumped storage unit protection for the foreign countries, such as Japan, Europe, South America, etc.

(8) Dale Finney will provide information on microprocessor relays & sequence components and how they may react during changeover between the modes of Motor and Generator.

(9) Preparing an outline of upcoming document.

(10) A section of lessons learned during rehabilitation of unit protection should be included in the outline of paper.

(11) Jon Gardell gave us a contact person (Nark Sanborsky or Dave McCammon) of AEP for Smith Mountain PG plant.

(12) Chuck Mozina might have a power plant working group contact person list that we might be able to use.

(13) Kevin Stephan explained that there is no limit on Transaction paper size if the document is prepared as members of an IEEE working group.

J8: <u>Generator Tutorial Revision</u>
Chair: Michael Thompson
Vice Chair: Chris Ruckman
Established: 2007
Output: Tutorial (published by PSRC)
Expected Completion: 2011
Status: ballot Phase I (document)

Assignment: Review and Revise 95-TP-102, “IEEE Tutorial on the Protection of Synchronous Generators.”

The Working Group met for a double session. Session one included 16 members and 9 guests. Session two included 20 members and 9 guests.

Output will be a special publication of the PSRC and published on the PSRC website. Phase two output will be an eight-hour tutorial presentation. An expected date of completion for phase 1 is January 2011. The expected date of completion for the draft tutorial slides is December 2010. We are presently on Ballot draft.

The minutes of the May 2010 meeting were approved as written.

Chair asked for volunteers willing to present the tutorial at the March PES PSCE. C. Mozina tentatively committed and will confirm availability by 9/24. J. Gers may also be available and will confirm availability by 9/23.

The tutorial will be presented at the San Antonio PCIC meeting next week by C. Mozina and M.

Thompson. The presentation includes a hardcopy of the slides and a CD with soft copies of the latest version of the tutorial and the slides. A disclaimer was added on the tutorial indicating that it has been through peer review but has not completed the J8 balloting process C. Mozina noted that the slides are skewed towards bus connected generators based on the anticipated interest of the audience.

Chair indicated that some tutorial slides from section authors have been received to date. Chair will make the slides created for the PCIC meeting available for use as a starting point. R. Patterson will make a separate, secured working area for the presentation slides. Chair will send out the link and login information for the working area as soon as it is created.

Chair indicated that the bibliography and references for the individual chapters of the tutorial seem to be complete. The bibliography for the entire document, however, is still incomplete. Chair will discuss with Z. Bukhala his assignment to update the bibliography using the latest version of C37.102 as a starting point.

Chair expressed disappointment with the number of ballots received to date and indicated that, because the document does not go out to a general balloting body, it will be the responsibility of the Working Group and the J-Subcommittee to thoroughly review the document. Chair asked that all members review the document and provide comments by October 15. Chair would appreciate all comments being made in the spreadsheet to allow for easy transfer to the master list.

Comments received to date from the balloting process were discussed. Resolution to individual comments is noted in the master comments listing.

R. Pettigrew iterated that the tutorial needs 75% of the Working Group membership and 51% of the J-Subcommittee membership to approve the document through the balloting process. Chair noted that the balloting pool's working group and J8 membership is being tracked. K. Stephan indicated that the tutorial will also require approval of the Officers.

F. Soudi commented that it would be prudent to have relevant undervoltage and generator breaker status blocking functions noted in each section of the tutorial. P. Shah and F. Soudi will review the entire document to confirm that blocking is addressed.

A significant discussion was held on the time delay setting for the out-of-step element. It was agreed that Chair and J. Gers would work on rewording the relevant parts of the tutorial section and would send the results to the entire Working Group for comment.

Chair distributed a list of slide authors for the tutorial presentation. Chair will contact each author to get a commitment to finalization of the slides. Chair noted that simple slides are preferred and he will resend the PowerPoint template for the slides. Default properties in the slides (fonts, styles, etc.) should be kept. Slides should be complete by the end of December.

J9: <u>Motor Bus Transfer</u>
Chair: Jon Gardell
Vice Chair: Dale Fredrickson
Established: 2006
Output: Working group report
Expected Completion: 2011
Status: Draft 4.0

Assignment: Investigate protection and control issues and phenomena impacting the effectiveness of safely transferring buses primarily consisting of motors from one power source to another source.

1. The Working Group met in a double session with 16 Members and 11 Guests on Tuesday September 14, 2010. This was the 14th meeting of the Working Group.

2. Jon Gardell, Chairman, gave a status report of the work performed to date.

3. In the first session, a presentation was made by Dale Finney on the analysis of field data from a motor bus transfer application at a combined cycle plant. Electrical quantities captured by a data recorder were used to calculate the resultant per-unit volts per Hertz across the breaker. The data was analyzed independently in two computer tool applications to determine the motor air gap torque. Overall the results were somewhat consistent, and the torque magnitudes calculated seem reasonable. However, there were some discrepancies in the torque calculations which require further investigation.

4. The focus of the second session was to review the assignment to provide a summary of the draft report for use in the current effort of Working Group J10 to revise C37.96, Guide for AC Motor Protection. The Working Group members felt that the summary should be expanded to include the items in Sections VIII and IX from the draft report on the dynamic conditions during the motor bus transfer, as well as application issues and concerns, which the WG feels will be of value to the users of the Guide.

5. The assignment for WG members is to review the write-up received on ring down tests, and to review the complete draft report and provide comments by September 30. The assignment to expand the summary for J10 is due by November 15.

J10: <u>PC 37.96 Guide for AC Motor Protection</u>
Chair: Prem Kumar
Vice Chair: Dale Finney
Established: 2007
Output: Guide Revision C37.96
Expected Completion:
Status: Draft 4.0

Assignment: Review and revise C37.96-2000 as needed.

The meeting was attended with 9 members and 7 guests. After the introductions, the Patent Slides were shown.

The Madison meeting minutes were circulated and approved with quorum.

Following are the follow up action items/assignments based on this meeting. All remaining assignments/peer review are due by December 15th. The various item number topics are shown in the last two sheets of this report.

1) Tom Farr would peer review the section on the pros and cons of Motors RTD protection written by Suhag Patel.

2) Pat Kerrigan and Subash Patel would complete summary text to discuss

microprocessor protection of high inertia motors, this effort is ongoing.

3) Dale Finney would work with John Gardell to enhance the first version of the summary document of the J9 group Motor Bus transfer effort based on comments from J9 group-this would be completed by November 15th for an initial review by the J9 group.

4) Prem would coordinate with WEG motors for their proposed presentation during January 2011 meeting. The initial topics that they would address are thermal limits, RTD locations, their design understanding of the ANSI C50.41, 1.33 resultant V/Hz at transfer requirement. Members would give Prem any other potential areas for WEG to cover by end of September and Prem will work with WEG.

JTF4: <u>Gen. Protection Issues-stability and dynamic control of Power Systems</u>
Chair: Kevin Stephan
Established: 2010
Output: Presentations to PSDP Committee
Expected Completion: 2011
Status: Second Meeting

Assignment: To develop an agenda for J subcommittee presentations at a joint meeting with PSDP in January 2011.

The task force met with 9 members and 35 guests.

Michael Reichard presented the existing PowerPoint presentations for the completed working groups of J5, Coordination of Generator Protection with Generator Excitation Control and Generator Capability, and J6, Performance of Generator Protection During Major System Disturbances. Both of these are summaries of published IEEE papers that include some reference to the need for dynamic or transient studies to properly protect generators. These two presentations will be among those presented at the January 2011 JTC meeting as an exchange of information with attendees from the Power System Dynamic Performance Committee (PSDP).

One area the PSDP is interested in is the touted need for coordination with the steady-state stability limit. There is some feeling this coordination is not necessary. Also it was noted during the task force meeting that the traditional P-Q plots are steady-state and do not recognize that there is actually AVR action and the voltage behind the reactance is not constant. Murty Yalla noted that NERC has done some studies on the 21 (system backup distance relays applied to generators) showing they can be a problem.

Other possible topics for discussion jointly with the PSDP were Power-Load Unbalance (PLU) equipment, modeling the shift in protective relay characteristics due to voltage and frequency changes, looking a various types of UELs (voltage-compensated, etc.).

Please send any other topics or questions that would be appropriate to Kevin Stephan and/or Murty Yalla, J SC chair/vice-chair.

See also the report for CTF3, as there are four presentations on system protection issues from C lined up for the January meeting with PSDP as well.

JTF7: <u>Considerations for "AURORA" Protection</u>

Chair: Mike Reichard
Established: 2010
Output: Report to Subcommittee
Expected Completion: 2011
Status: First Meeting

Assignment: To review and provide comment on the protection and control vulnerability known as "AURORA".

1. Introductions – 8 members & 16 guests
2. J Chairman, Kevin Stephan began JTF7 with a brief discussion of the vulnerability of motors and generators connected to the power grid, dubbed "AURORA", NERC's role and the possibility that the PSRC has a role via JTF7.
3. Chuck Mozina gave a presentation entitled "CYBER SECURITY – THE AURORA PROJECT, System Vulnerability – Fact or Fiction". This presentation provided the background information of the Aurora Project conducted at Idaho National Labs in 2007. The JTF7 meeting members were generally skeptical that the AURORA PROJECT results represented realistic vulnerabilities.
4. Mike Reichard reviewed and discussed the AUROA Overview document provided by DOD in November 2009.
5. Tom Wiedman gave a presentation discussing the salient points of an upcoming NERC AURORA Advisory.

Summary: The consensus was that JTF7 should conduct further review and analysis of AURORA prior to release of the NERC AURORA Advisory. JTF7 recommends the J Subcommittee request the PSRC Main Committee to correspond the following to NERC on this matter:
"The IEEE Power System Relaying Committee (PSRC) would like to provide NERC with additional subject–matter expertise on the gap in protection for rotating machines known as "Aurora". The IEEE PSRC Officers request that NERC consider withholding the pending ES-ISAC Aurora Advisory until February 1, 2011. By that date, the IEEE PSRC would like to provide additional study and comments."

Post Meeting Note: NERC graciously declined to withhold the advisory and it was issued On October 14, 2010. The next meeting of JTF7 will be focused on how this group can help users determine the extent the AURORA alert applies to their assets and to determine the future direction of the task force.

Other Reports:

C17: Fault current contribution from wind farm plants

A verbal report was given on the C17 meeting and the minutes can be found in C subcommittee report.

Liaison Reports

Electric Machinery Committee (EMC) C.J. Mozina

The Committee met at PES General Meeting in Minneapolis --- July 25-29, 2010. The major area of interest to the PSRC is a WG within EMC on Generator-Grid Interaction chaired by Thomas Wait. The group had several previous meetings and determined that they did not have enough information to proceed with the development of a detailed technical paper. The objective of the group was changed to write a paper on the following:

- Description of backgrounds of known events

- Problems in getting information on the events
- Grid components that contribute to the events
- Concerns rising from the events
- Required instrumentation to capture data of a future event

At the last WG meeting an outline was put together to start developing a paper around these issues. Assignments were given to various members of the WG.
Other EMC developments includes publication of the Generator Rewind Guide, IEEE 1665 which won the PES Award for Best New Standard.

IAS I&CPS Committee C.J. Mozina

This report will be given at the main PSRC committee meeting. The written report is published under main committee liaison reports.

Nuclear 1E WG P. Kumar

IEEE 741 group (protection of Nuclear 1E systems and equipment) is developing a paper "Rethinking degraded grid protection" in response to NRC pushing plants to raise degraded voltage settings during the CDBI (component design basis Inspections). This "increased voltage setpoint" raises the concern of IE systems spuriously going on the Emergency Diesel Generator. The plan is to draft a paper by end of 2010 and present in 2011. IEEE 741 will be reviewed for possible impact and may be revised.

NERC J. Uchiyama

NERC SPCS Activities:

(1) SPCS is currently working on "Backup Protection" which is based on the following events:

- Westwing
- Broad River
- Florida

(2) Power Plant and Transmission Line Protection Coordination

This document (White Paper, Technical Paper) had been approved by NERC PC. Now, J3 Working Group is working on PSRC interaction with this document, by Jon Gardell and Phil Waudby.

(3) PRC-005 (Protective Relay Testing Requirement, Testing Cycle, etc.)

Drafting Team (Chair by Phil Winston and Bill Meadow) is working on the definition of "Protection System" –
Protection relays which respond to electrical quantities,

- Communication systems necessary for correct operation of protective functions,
- Voltage and current sensing devices providing inputs to protective relays
- Station dc supply associated with protective functions (including station batteries, battery chargers, and non-batteries-based dc supply), and
- Control circuitry associated with protective functions through the trip coil(s) of the circuit breakers or other interrupting devices.

(4) PRC-001-2

This DT (Drafting Team) is in a similar situation [to PRC-005] since Chairman of the DT is Phil Winston as well.

Coordination Reports
None

Old Business
None

New Business
None

K: SUBSTATION PROTECTION SUBCOMMITTEE
Chair: F. P. Plumptre
Vice Chair: P.G. Mysore

K: SUBSTATION PROTECTION SUBCOMMITTEE
Chair: P.G. Mysore
Vice Chair: M. J. Thompson
The K-Subcommittee met on Wednesday, September 15, 2010 in Berkeley, CA, with 21 members and 30 guests in attendance. A quorum was achieved to approve the minutes of the May 2010 subcommittee meeting.
. **Reports from the WG Chairs**
K4: (PC 37.95.2002): GUIDE FOR PROTECTION CONSUMER UTILITY INTERFACE
Chairman: Mukesh Nagpal
Vice Chair: Chuck Mozina
Established: 2008
Output: Guide Revision
Expected Completion Date: 2012

Assignment: To revise C37.95-2002 (R2007) – Guide for Protective relaying of Utility-Consumer Interconnections
The working group met on Tuesday, September 14th, with 11 members and 9 guests present, including 3 new members who accepted working group assignments. A quorum was not present. Ken Behrendt served as Vice-Chair during the meeting in Chuck Mozina's absence.
After introductions, the chairman presented the minutes from the May, 2010 meeting. There were no changes suggested by the members in attendance. The chairman will request approval of the May meeting minutes via email because there was no quorum present.
The IEEE Patent slides were shown and reviewed.
The chairman asked for volunteers to redraw several figures in the document. Steve Conrad and Steve Turner volunteered and will work with each other to divide up the assignment.
The chairman presented the September, 2010 draft of the document. All comments received for sections 1 through 5 have been incorporated in this draft. Comments on the other sections, which received after release the latest draft to WG, have not yet been incorporated in the draft document.
There was some discussion about the need for definitions. Shyam Musunuri volunteered to define "consumer" and will work with Adi M. to incorporate definitions in a new section 3. The working group agreed that definitions of relevant terms should be included in section 3 even though they may already be defined in the IEEE database. Those terms already defined are to be included under a heading stating that these terms are defined in the IEEE database. Those terms that are not already defined in the IEEE database will be included under a heading stating that. (Mal Swanson can provide a password to access the IEEE database to search for definitions.)
The chairman proceeded with a review of sections 1 through 5, focusing on a few key issues of

concern:

• Regarding existing Section 3.3, Information Exchange, the chairman discussed the need to provide the short circuit Thevenin impedance in ohms instead of the presently stated short circuit current and X/R ratio. Discussion indicated that some short circuit programs used by consultants accept only short circuit current (or MVA) and X/R ratio. At least one utility member indicated that they supply the output of their short circuit report that includes both. The chairman expressed concern that providing only short circuit current and X/R ratio may not be accurate enough. The chairman will rewrite the paragraph to incorporate comments and present it in the next draft.

• Regarding existing Section 3.4.2.2, Momentary outages and voltage dips, the chairman proposed adding a paragraph referencing the ITIC (formerly CBEMA) curve to define limits of voltage fluctuations that consumer loads can inflict on the utility power system. After some discussion it became clear that the existing paragraph is intended to convey information from the utility to the consumer about voltage sags and swells that the consumer needs to be able to tolerate. It was decided to add an item in the section on information exchange that the consumer needs to convey to the utility about the voltage sags and swells they can cause on the utility system.

• Regarding existing Section 5.2.1, Circuit interrupting devices, it was agreed that circuit switchers are still a viable circuit interrupting device. The main concern is that circuit switchers do not include CTs, so if the CTs on the transformer high-side bushings are used for the consumer equipment protection, the protection zone does not overlap the interrupting device and the utility becomes responsible for protecting the limited area between the circuit switcher and the transformer high-side bushings. Mike Meisinger mentioned that one circuit switcher manufacturer makes a sensing device that may be applicable to provide the desired protection zone overlap. Mike agreed to review and revise paragraph on circuit switcher.

• Also with regard to Section 5.2.1, it was agreed that the paragraph referring to bolted pressure switches should be removed because they are only used on low voltage systems not covered by this guide.

• Section 5.2.1 also refers to capacitive trip devices. At least one comment was received indicating that the guide should discourage the use of capacitive trip devices for HV consumer interconnections. Mike Jensen and F. Soudi will work together to revise this paragraph accordingly.

Writing assignments are due to the chairman by November 1st.

K5: APPLICATION OF COMMON PROTECTIVE FUNCTIONS IN MULTI-FUNCTION RELAYS
Chair: Simon Chano
Vice Chair: Dean Miller
Established, 2005
Output: Report to the PSRC
Expected completion date: 2010
Full paper and summary paper are complete.

Assignment: Develop a document that addresses the considerations in applying the ancillary protection and control functions that are common in multiple relays and the integration of these functions into the overall protection system. This document addresses subjects related to specific topics such as: breaker failure, automatic reclosing, synchronism check, voltage status monitoring, breaker controls, and event and fault recording. The applications of duplicate protective schemes are discussed with consideration for security, dependability, testing, and maintenance.
Working Group K5 was disbanded. They have completed their assignment. The summary paper will be presented at WPRC in October by Roger Whittaker. The paper has been accepted at Texas A&M for next spring and will be presented by Michael Thompson.

K6: SUDDEN PRESSURE PROTECTION FOR TRANSFORMERS
Chair: Randy Crellin

Vice Chair: Don Lukach
Established: May 2005
Output: Report
Expected Completion Date: January 2011
Draft 2.0

Assignment: To complete a technical report to the Substation Protection subcommittee on the application of sudden pressure relaying in power transformers.
The working group met on Tuesday morning, September 14th, in a single session with 8 members and 8 guests. The working group currently has 18 members.
After introductions and a brief review of the working group progress, we again discussed the results of the sudden pressure relaying survey. We worked on identifying ways to interpret the data and provide editorial comment to help the reader better understand the responses. After going through the complete survey, we decided to form a smaller group of volunteers (Gene Henneberg, Greg Sessler, and Steve Turner) to help summarize the survey responses.
The remaining working group members were asked to review the latest draft of the document for content and to provide comments and/or suggestions for additional writing assignments. These comments are due by October 15th and will be discussed along with the final survey report during our next meeting in Atlanta.

K8: GUIDE FOR THE PROTECTION OF SHUNT CAPACITORS
Chair: Pratap Mysore
Vice Chair: Ilia Voloh
Established, 2006
Output: Revision of IEEE C37.99-2000
Expected Completion date: 2011
Status: Draft 4.2

Assignment: Revise and update C37.99-2000 "Guide for the Protection of Shunt Capacitor Banks."
The Working group, K8, met on September 14, 2010 in one session with 14 members out of 26 and 6 guests in attendance. Meeting quorum requirements were met. After the introductions, IEEE Patent slides regarding the patent policy were shown. May 2010 meeting minutes was approved.
Bogdan briefly explained his submittal on "Theory of Unbalance Protection Methods for Shunt Capacitor Banks". Members agreed to include it in the main document in clause 8- Unbalance Protection Methods.
Bogdan's submittal on current integration method for over voltage protection will be included in clause 7.2.2 – over voltage protection methods.
There was a discussion on selection criteria for instrument transformers- CTs and PTs. Pratap showed results of Ferro-resonance studies on PT and the effect of D.C. resistance of PT primary winding. The results will be sent out to the members.
Pratap pointed out that the PAR will end in December of 2011. In order to complete the work, the proposed course of action would be to have a ballot ready draft by the end of 2010. This needs a more coordinated effort including an effort to make drawings consistent. Jeff Pope will review all the drawings and update them as needed. There will be teleconference before Jan 2011 meeting to get a ballot ready draft ready for the January meeting. After approval from the working group and Capacitor sub committee members and the main committee, the draft is expected to be balloted by IEEE before May 2011 meeting. Bogdan has offered to set up conference calls for teleconference. The dates will be finalized soon.
Action item from previous meeting - The referenced paper by John Harder included in the guide points out to an abstract of the paper instead of the paper. This paper was presented at a PES summer meeting. IEEE is figuring out a way to make this paper available. IEEE is reviewing this. Bruce Pickett mentioned that this paper was reprinted in 1990 Transactions. Pratap will update the reference in the guide.
Updated draft will be sent out to members within two weeks and the chair requests active participation and quick response from members before October 15, 2010. The drawings update

will continue as the wordings and contents are reviewed.
Rick Taylor and Jeff Pope signed up to be members of the working group.
The next meeting will be a joint meeting with Capacitor T&D committee.

K10: SCC21 DISTRIBUTED RESOURCES STANDARD COORDINATION
Chair: Gerald Johnson
Vice Chair: TBA
Established, 1999
Output: Standard through the SCC 21
Expected Completion Date: 20xx

Assignment: To interface with SCC21/P1547 in order to reduce unnecessary delays by getting PSRC input into the process without having to wait for after-the-fact coordination**.**
K10--SCC21 Distributed Resources Standard Coordination working group met Sept 14, 2010 with 5-members and 6-guests. Status of the active working groups in the 1547 series were reviewed as follows:
IEEE-1547.1-2005 "Standard Conformance Test Procedures for Interconnecting Distributed Energy Resources with Electric Power Systems" James Daley, Chair; Ben Kroposki, Secretary, is out for reaffirmation. Ballot closes on 9-27-10.
P1547.4 "Draft Guide for Design, Operation and Integration of Distributed Resource Island Systems with Electric Power Systems", has been balloted and "affirmed". Comments have been resolved and the document has been or soon will be recirculated.
P1547.5 "Draft Technical Guidelines for Interconnection of Electric Power Sources Greater than 10MVA to the Power Transmission Grid", no activity, no draft.
P1547.6 "Recommended Practice for Interconnecting Distributed Resources With Electric Power Systems Distribution Secondary Networks" has been balloted and "affirmed". Comments are being resolved but they do not expect recirculation until the first of the year.
IEEE P1547.7 "Draft Guide to Conducting Distribution Impact Studies for Distributed Resource Interconnection" is accepting comments on the current draft and will use those comments draft 4.1 which will be posted by 11-15-10.
A new working group, IEEE P1547.8 "Recommended Practice for Establishing Methods and Procedures that Provide Supplemental Support for Implementation Strategies for Expanded Use of IEEE Standard 1547" met for the first time at the August 2010 meeting. As yet, no draft information is posted on the SCC21 web site.
The next P1547.x working group meetings will probably be in February 2011. If you have special interest in the progress of a particular SCC21 working group or would like to provide input, let me know and I will make sure the information gets to the right place.

KTF1: Investigate update of PSRC report, "Protection of Phase angle regulating transformers" dated October 21, 1999.
Chair: Arvind Chaudhary
Vice Chair: NA
Established: Sept. 2010
Output: Recommendation to K subcommittee on whether to form a working group
Expected Completion Date: TBA

Assignment: Investigate update of PSRC report, "Protection of Phase angle regulating transformers" dated October 21, 1999**.**
KTF1 met on September 13th, 2010 with seven attendees. The group discussed the existing report and felt that due to increased need to control power flow in existing lines phase shifting transformers were getting more popular in the system. The 1999 report was generally based on older electromechanical relay and could be improved upon to reflect the changes in the industry in the last ten years. For example, the name "Phase Angle Regulating Transformer" is used instead of "Phase Shifting Transformer". It was decided that the Task Force would study the report and tabulate the protection functions in the report and also tabulate the areas the report could be improved upon. We would also like to evaluate the existing Transformer Protection Guide C37.91 and determine if there is no overlap. We plan on presenting the Tabulation to the K Subcommittee

to determine whether a Working Group ought to be formed and if the Working Group should be at the level of a Guide or a Report.
Discussion during the K subcommittee meeting indicated that the subcommittee would prefer to not include extensive material on PSTs in C37.91.

KTF2: Investigate CT Column Flashover Protection, improving security of CT column flashover protection.

Chair: Bruce Pickett for Dominic Fontana
Vice Chair: NA
Established: Sept. 2010 Disbanded Sept. 2010
Output: Recommendation to K subcommittee on whether to form a working group
Expected Completion Date: TBA

Assignment: **Investigate CT Column Flashover Protection, improving security of CT column flashover protection.**

Meeting was called to order Sept 15, 2010 with 2 members and 9 guests
Introductions were done and attendance was taken.
Email from Dominic was discussed (see bottom).
Mini tutorial on freestanding ct types and gfct/fbct location
Bruce Pickett reviewed a "mini-tutorial" PowerPoint of freestanding CT designs and ground fault CTs and how the different designs with primary internal exposure are more susceptible to failure that would be more beneficial for having the gfct/fbct for detecting internal faults.
Discussion followed
Bruce Magruder remarked that ITEC sees a minority of orders with the requirement of gfcts as part of the freestanding ct.
Gary Kobet discussed some issues that his company had seen or were concerned with, fail to trip, not needed, how they were applied and open discussed followed as well as any misoperations of the gfct schemes and very few misops were talked about.
Don Seveik discussed how his company applied the gfct scheme on his transmission freestanding cts and breakers with insulated grounds between breakers and fbcts on the ground cables.
The Bus Protection Guide C37.234-2009 was displayed and Chap 8 was reviewed to see the references for gfcts and Bogdan discussed these applications.
Bruce discussed the advantages that having the gfct present gives to the freestanding ct for both internal fault detection, external fault detection (contamination, foreign interference, wire, etc), faulted ct identification, instantaneous backup to the primary protection scheme, etc.). As an external flash fault detection it will often provide faulted component location to help locate which piece of equipment flashed that saves time in locating the equipment when it is not readily located in the substation. Bruce's company uses gfcts on all of its freestanding cts.
After all of the discussions, it was unanimous that there was insufficient reason to pursue the Task Force or Working Group going forward and to request that the Task Force be disbanded at this time.
Subcommittee passed a motion to disband the task force

KTF3: Reducing Outages Through Improved Protection, Monitoring, Diagnostics, And Auto restoration In Transmission Substations

Chair: Bruce Pickett
Vice Chair: Paul Elkin
Established: September, 2010
Output: Papers – 1. Full Paper, and 2. Summary Transactions Paper
Expected Completion Date: Dec, 2013
Draft xxx Transactions Summary paper xxxx

Assignment: **To prepare a paper or a report on protection methods that reduces outage durations in substations with auto restoration and communication techniques**

Meeting was called to order Sept 14, 2010 with 3 members and 3 guests (previous May meeting had 2 members and 8 guests)
Introductions were done and previous minutes were discussed.

Scope was reviewed with a slight change in the title. Reducing Outages Through Improved Protection, Monitoring, Diagnostics and Autorestoration In Transmission Substations.
We reviewed the list of topics developed for transmission autorestoring topics at the last task force meeting and adjusted the list. Some of the reclosing topics from the previous list that were covered in the C37-104 Reclosing Guide WG were removed from the list still leaving substantial subjects to cover.
We reviewed this new topic of asking the Subcommittee permission to move forward from a Task Force to a new WG to do a paper on Reducing Outages Through Improved Protection, Monitoring, Diagnostics and Autorestoration In Transmission Substations.
It was approved at the subcommittee meeting to elevate this task force to become working group K3. The proposed working group chair and vice-chair were subsequently approved by the PSRC leadership.

KTF4: JOINT TASK FORCE T & D CAPACITOR SUB-COMMITTEE, K13 SERIES CAPACITORS
Chair: Simon Chano
Vice Chair: Mark Mcvey
Established: October 2009
Output: jointly prepare a PAR to issue a corrigendum to the guide.
Expected Completion Date: TBA

Assignment: Coordinate PSRC standards activity with Capacitor Subcommittee
KTF4 did not meet at this meeting.

Liaison Reports:
Nothing to report

Old Business:
C37.119 was balloted for affirmation. The document passed but will have to be recirculated due to a single negative ballot.
WG K5 was disbanded.

New Business:
Nothing discussed.

VII PRESENTATIONS:

Our main committee meeting is greatly enhanced by presentation by our members of the outputs of the different working groups. We always appreciate their efforts. This time we had two interesting presentations.
Guide for Power System Protection Testing C11 Vahid Madani
Processes, Issues, Trends, and Quality Control in Relay Systems Steve Kunsman

VIII. Chairman Sanders was thanked by the group for eight years of dedicated service as an officer of the PSRC. A round of applause ensued. The meeting was adjourned by Chairperson Miriam Sanders