



**POWER SYSTEM RELAYING COMMITTEE  
OF THE IEEE POWER and ENERGY SOCIETY  
MINUTES OF THE MEETING  
September 12–15, 2011  
Minneapolis, MN  
First Draft**

**I. Call to order / Introductions Bob Pettigrew**

Chairman Bob Pettigrew called the meeting to order at 8:00 am  
After introductions, a quorum was verified and Main Committee Attendance sheet was routed.

**II. Approval of Minutes & Financial Report Mike McDonald**

The minutes of the Asheville May 2011 meeting were approved as posted.  
Great River Energy, HDR, Xcel Energy and Ulteig were recognized for their financial contributions to our Coffee Breaks.

**Chairman's Report Bob Pettigrew**

None

**III. Reports of Interest**

**A. Technical Paper Coordinator's Report – Roger Hedding**

**2011 General Meeting Detroit**

PSRC sponsored 4 paper sessions of which 27 papers were presented, and one poster session where there was supposed to be 3 papers posted. 2 presenters from the paper sessions and 2 papers from the poster session did not show up. My thanks to Alex Apostolov, and Fred Friend for chairing two of the paper sessions, and Charlie Henville for looking after the poster session.

**2012 T&D Conference, May 7 – 10, 2012 Orlando**

The theme is "Making Innovation work for Tomorrow". Paper site opened August 12, and closes on September 19<sup>th</sup>. I'll be contacting you as papers are posted on the site.

**2012 General Meeting, July 22- 27, 2012 San Diego**

Website for paper submission opens November 1, 2011.

**Paper Approval Criteria**

There is a perception by some that too many papers are being approved for conferences. Where we only had 27 papers approved for the 2011 general meeting there were other groups that had over 400 papers. Task force formed to look at criteria for acceptance for paper reviewers. More information on this as task force results are presented.

**Future Meetings**

Jan. 9-12, 2012

(JTCM) Hyatt Regency Orange County, Garden City, CA

May 13-17, 2012

Astor Crowne Plaza Hotel, New Orleans (NEW)

Sept. 10-13, 2012	Hilton Portland; Portland, OR
Jan 2013	JTCM (TBD)
May 12-16, 2013	Tremont Plaza Hotel, Baltimore, MD
Sept. 8 -12, 2013	Hotel Albuquerque at Old Town Albuquerque, NM

**B. CIGRE B5 Activities Report - Adamiak**

No report submitted

**C. IAS Power System Protection Committee - Mozina**

No report submitted

**D. IEC Report - Eric Udren**

**TC 95, Measuring relays**

TC 95 drives measuring relay standards – electrical and physical environment type testing, design, safety, and functional behavior. Technical work is carried out by Maintenance Teams (MTs) and by Working Groups.

The recently emerging suite of functional standards is developed by MT4. The Convenor of MT4 is Dr. Murty Yalla. MT4 has already published functional standards 60255-151 (Overcurrent relays) and 60255-127 (Over and undervoltage relays). Their current projects are 60255-121 (Functional standard for distance relays), 60255-149 (Thermal electrical relays), and 60255-187-1 (Functional standard for differential relays – generator and transformer differential). 121 and 149 standards drafts are advancing to CDV (voting draft) stage, with 187 project work just getting underway. The May report gives background specifics on these projects. Any PSRC attendee interested in reviewing circulated documents should contact Eric Udren for a copy.

Draft IEC TC 95 design and type testing standards currently circulated from IEC Central Office in Geneva for US National Committee Comment:

- 60255-27 – Committee Draft (CD) - *Product safety requirements for measuring relays and protection equipment*. This standard addresses mechanical, construction, insulation, and materials requirements. This new edition absorbs the contents of the existing 60255-5, *Insulation coordination for measuring relays and protection equipment - Requirements and tests*. 60255-5 will be eliminated. The result should be simplification and better organization of the total suite of testing and validation requirements, but we want to watch for changes that lead to design issues for relays. PSRC participants, especially those associated with design of relaying products, are invited to review this document that can impact the IEC and CE safety compliance of their designs. Contact Eric Udren for a copy, and please provide review comments by late October.

**TC 57, Power systems management and associated information exchange**

See TC 57 Liaison Report at the end of Subcommittee H minutes.

**E. Standard Coordinators Report – Phil Winston**

**Standards Activities since the May, 2011 meeting:**

The status of standards activities that have taken place since the May, 2011 meeting of the PSRC are as follows.

- **Standards Published**  
None
- **Standards waiting to be Published**  
PC37.110/COR 1 Guide for the Applications of Current Transformers Used for Protective Relaying Purposes

- **Standards Reaffirmed**  
None
- **Standards submitted for reaffirmation**  
None
- **Standards approved**  
PC37.238 Standard Profile for Use of IEEE Std. 1588 Precision Time Protocol in Power System Applications
- **Standards submitted for approval**  
PC37.238 Standard Profile for Use of IEEE Std. 1588 Precision Time Protocol in Power System Applications
- **Standards to be submitted for approval**  
None
- **Submitted for Balloting/ Recirculation**  
  - C37.90.1 Standard Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
  - C37.90.3 IEEE Standard Electrostatic Discharge Tests for Protective Relays
  - C37.101 Guide for Generator Ground Protection
  - C37.102 Guide for AC Generator Protection
  - PC37.118.1 Standard for Synchrophasor Measurements for Power Systems
  - PC37.118.2 Standard for Synchrophasor Data Transfer for Power Systems
  - C37.231 IEEE Recommended Practice for Microprocessor-Based Protection Equipment Firmware Control
  - PC37.232 Standard for Common Format for Naming Time Sequence Data Files (COMNAME)
- **Standards Balloted**  
  - C37.90.1 Standard Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus
  - C37.90.3 IEEE Standard Electrostatic Discharge Tests for Protective Relays
  - C37.101 Guide for Generator Ground Protection
  - PC37.118.1 Standard for Synchrophasor Measurements for Power Systems
  - PC37.118.2 Standard for Synchrophasor Data Transfer for Power Systems
  - C37.231 IEEE Recommended Practice for Microprocessor-Based Protection Equipment Firmware Control
  - PC37.232 Standard for Common Format for Naming Time Sequence Data Files (COMNAME)
- **Standards Re-circulated**  
None
- **Standards to be Re-circulated**  
None
- **Standards due for 5 year review /to be submitted for Re-affirmation**  
  - C37.90.3 Standard Electrostatic Discharge Tests for Protective Relays
  - C37.96 Guide for AC Motor Protection (active PAR)
  - C37.99 Guide for Protection of Shunt Capacitor Banks (active PAR)
  - C37.101 Guide for Generator Ground Protection
  - C37.102 Guide for AC Generator Protection
  - C37.109 Guide for the Protection of Shunt Reactors

C37.111	Standard Common Format for Transient Data Exchange (COMTRADE) for Power Systems (active PAR)
C37.113	Guide for Protective Relay Applications to Transmission Lines (active PAR)
C37.231	Recommended Practice for Microprocessor-based Protection Equipment Firmware Control
C57.13.1	Guide for Field Testing of Relaying Current Transformers

- **Standards withdrawn**  
None
- **New PARs applied for**  
None
- **New PARs approved**  
None
- **PAR Extensions applied for**
  - PC37.96          Guide for AC Motor Protection
  - PC37.99          Guide for Protection of Shunt Capacitor Banks
- **PAR Extensions approved**
  - PC37.99          Guide for Protection of Shunt Capacitor Banks
- **Modified PAR approved**  
None
- **Modified PAR Submitted**  
None
- **PARs Withdrawn**  
None
- **PARs expiring at the end of 2011**
  - PC37.96          Guide for AC Motor Protection
  - PC37.99          Guide for Protection of Shunt Capacitor Banks
  - PC37.111        Standard Common Format for Transient Data Exchange (COMTRADE) for Power Systems
  - PC37.237        Recommended Practice for Time Tagging of Power System Protection Events

#### **SUBMITTAL DEADLINES & STANDARDS BOARD MEETING SCHEDULE**

<b>PAR/Standard Submittal Deadline</b>	<b>Standards Board Meeting</b>
October 17, 2011	December 6, 2011

#### **F. Substations – Craig Pruess (Summary only)**

1. John Tengdin will get in contact with the City of Anaheim; will talk with California contacts,
2. <http://sequi.com/> was recommended for 1711 product development
3. Matthew (IEEE) – Talked of New PAR processes, send note to rev com admin to upgrade to full use status
4. John Tengdin will get in contact with Orange County PES chapter
5. John Tengdin will contact Tien Van of <http://sequi.com/>
6. Gave committee report, outline of substations C1-C14
7. Sam S. submitted PAR for 1686-2011 (2007 approved) – C1
8. Reviewed updated ICAP presentation and discussed how ICAP will impact the working groups. Chair will set up meeting with ICAP and working group chairs for standards.

## **G. NERC Report – Phil Tatro**

Phil Tatro reported on protection-related NERC activities. The NERC System Protection and Control Subcommittee (SPCS) is engaged with the NERC Transmission Issues Subcommittee (TIS) on developing two reports to support future reliability standard development. The first report addresses the subject of protective relay response to power swings and will support development of a standard on this subject as directed in FERC Order No. 733. The second report addresses the existing NERC glossary definition of Special Protection System (SPS) and related standards to serve as a reference document for a standard drafting team.

Reliability standard PRC-005-2, Protection System Maintenance and Testing, failed to reach ballot pool approval in the recirculation ballot that ended June 20. The standard drafting team has revised the standard, and updated the Supplemental Reference and FAQ document. The SDT has a webinar scheduled September 15 to review these revisions with industry. PRC-005-2 is posted for comment through September 28, with a concurrent 10-day initial ballot the last 10 days of the comment period.

The System Protection Coordination standard drafting team is developing a new standard that will be specific to protection system coordination for faults. The non-fault protection requirements of PRC-001 will remain intact and be retired as they are appropriately transferred to other standards. A complete plan for how each of the coordination issues contained in the “Power Plant and Transmission System Protection Coordination” technical reference document will be addressed will be filed with the new standard.

The Generator Verification standard drafting team scope includes two protection and control standards: PRC-019-1, Coordination of Generator Voltage Regulator Controls with Unit Capabilities and Protection and PRC-024-1, Generator Performance During Frequency and Voltage Excursions. Both standards were posted for comment in June; the posting of PRC-024 included a concurrent 10-day initial ballot. PRC-024 failed to achieve ballot pool approval. The drafting team is addressing comments from the posting of these standards.

The Protection System Misoperations standard drafting team is developing a revision to PRC-004 to establish uniform requirements for identifying and investigating protection system misoperations. This revised standard PRC-004-3 will replace the existing PRC-003 (requires regional procedures to address misoperations) and PRC-004 (requires entities to follow regional procedures). The drafting team is addressing comments from the posting that ended July 11.

NERC and FERC have initiated a joint inquiry into the September 8 power outage in Southern California, parts of Arizona and Northern Baja Mexico. FERC and NERC will coordinate with the Department of Energy and other federal agencies, the California ISO, WECC, California and Arizona state regulators and the companies involved to monitor the situation. The inquiry will focus on causes of the outages.

## **IV. ADVISORY COMMITTEE REPORTS**

**Chair: Bob Pettigrew**

**Vice Chair: Roger Hedding**

**B1: Awards and Technical Paper Recognition**

**Chair: Oscar Bolado**

**Vice Chair: Solveig Ward**

The B1 Working Group met on September 13th, 2011 in Minneapolis, MN, with 6 of its 7 members.

The minutes of the last meeting were reviewed and approved.

The 2011 Distinguished Service Award was discussed. Additional criteria have been included. The candidate list will be reviewed and a new list will be circulated. Voting will be done via email.

Price paper and WG recognition awards were discussed. Price paper candidates have been selected. Papers will be circulated and voting will be done via email. The WG recognition award has been selected.

With no additional business to discuss the meeting was adjourned

The IEEE PES hosted its 2011 General Meeting in Detroit, MI last July. We are glad to report that three works by PSRC have been selected for an award. These are:

WORKING GROUP RECOGNITION AWARDS – Two PSRC WGs were awarded 2 out of 2 awards

Outstanding Technical Report

- “PSRC WG I 19, Redundancy Consideration for Protective Relaying Systems”; Solveig Ward, Chair; Bryan Gwyn, Vice-Chair

Outstanding Standard or Guide

- “IEEE C37.230-2007, IEEE Guide for Protective Relay Applications to Distribution Lines”; William P. Waudby, Chair; Randall P. Crellin, Vice Chair

PRIZE PAPER AWARDS – A PSRC WG was awarded 1 out 2 Prize papers.

- “IEEE PSRC Report on Performance of Relaying During Wide-Area Stressed Conditions” Damir Novosel, George J. Bartok, Gene Henneberg, Pratap Gopal Mysore, Demetrios A. Tziouvaras, Solveig Ward

Congratulations to all the volunteers.

**B2: Fellows Awards**

**Chair: J.S. Thorp**

Group did not meet.

**B3: Membership Committee**

**Chair: M.J. Swanson**

Attendance during the PSRC meeting was approximately 201.

17 new attendees were in our Newcomers Orientation meeting on Tuesday.

No retention support letters were written. No Service Awards were presented

**B4: O & P Manual and WG Training**

**Chair: J Appleyard: O&P Manual**

**Chair: R Hunt: WG Training**

Group did not meet.

**B5: Bibliography and Publicity**

**Chair: T.S. Sidhu**

**Vice Chair: M. Nagpal**

Group did not meet.

**B8: Long Range Planning**

**Chair: Miriam Sanders**

No report.

**B9: PSRC Web Site**  
**Chair: Russ Patterson**  
Did not meet.

**V. SUBCOMMITTEE REPORTS**

**C: SYSTEM PROTECTION SUBCOMMITTEE**

**Chair: S. Ward**  
**Vice-Chair: J. O'Brien**

The C System Protection Subcommittee met on Thursday, September 15, 2011, in Minneapolis, MN with 24 members and 31 guests in attendance. Quorum was not reached.

7 Working Groups and 2 Task Forces met at this meeting.

PSCE liaison report: Nothing to report.

PSSC liaison report: Report is included in the CTF3 meeting minutes.

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**OLD BUSINESS**

None

**NEW BUSINESS**

None

**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, Role of Protective Relaying in the Smart Grid, met on Tuesday with 12 members and 12 guests.

In the absence of the WG Chair and Vice Chair, the meeting was chaired by Solveig Ward. Unfortunately, she had not had a chance to prepare as the Chair had not informed Sub C that he would not attend the September meeting.

The session consisted of brain storming, trying to identify Smart Grid functions external to the conventional utility applications that could benefit from data and/or functionality provided by protective relays.

Mark Simon, Chair of the parallel H2 WG dealing with Smart Grid communications requirements agreed to share the H2 draft with C2 members in order for C2 to avoid overlap with this group.

The H2 draft will be sent out to C2 members with the September meeting minutes and members were assigned to read the draft before the January meeting.

For the January 2012 meeting, the working group requests a single session, a room to accommodate 40 people, and a projector.

The working group chair and vice chair will organize the submissions and post the revised draft. All members need to review the document before the next meeting, and come prepared with comments and contributions.

**C4: Guide for Phasor Data Concentrator Requirements for Power System Protection, Control, and Monitoring (PC37.244)**

**Chair: Galina Antonova**

**Vice Chair: Vasudev Gharpure**

**Output: Guide C37.244**

**Established: January, 2011**

**Estimated Completion Date: To be determined**

**Assignment:** Develop a guide for performance, functional, and information communication needs of Phasor Data Concentrators for power system protection, control, monitoring, and information management. The Guide will include system needs for PDC applications, configuration, and testing procedures.

Working Group C4 met on September 13, 2011 in Minneapolis, MN in a double session with 21 attendees (11 members and 10 guests). Quorum was not achieved. May 2011 meeting minutes will be approved electronically.

After introductions, Working Group Chair presented IEEE Patent Policy slides and asked to bring up any patent issues. None were identified.

Working Group Chair updated the group on project status:

- Working PC37.244 draft is dated July 29, 2011
- 1<sup>st</sup> Conversion to IEEE format completed in August 2011
- Review by IEC TR 61850-90-5 experts is planned
- PDC Functions (Section 5) were agreed
- PDC Requirements (Section 5) is in works.

Discussion on Advanced Communication Requirements (Section 6.2.2) followed. The group agreed that core discussion and agreements are needed on Data Alignment and Data Aggregation functions. It was suggested to re-order and move sections from Advanced Communication Section to Data Alignment section, then continue discussions on this topic.

Working Group Chair reminded that the group has regular conference calls on Monday and Friday 10am – 11:15am Pacific time, and invited members and guests to participate.

Requirements for the next meeting: a double session, meeting room for 30 people with a computer projector.

**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).

The Working Group met on September 14, 2011 in a double session. Sessions were chaired by vice-chair Paul Myrda. The first session had 13 members and 9 guests and the second session had 10 members and 6 guests.

The IEEE-SA Patent Slides were presented – there were no comments from the participants.

The minutes of the May 2011 meeting were approved in the first session with a quorum of members.

During the first session, the document revisions were reviewed and discussed. This activity was led by Vahid Madani.

During the second session there was a discussion led by Solveig Ward on the ability/availability of the current Chair to continue in this capacity due to extensive external and business related time demands or to replace him with a new Chair that will be able to attend to the WG process more effectively. There was a motion to elect a new chair and Farnoosh Rahmatian volunteered and was approved by the working group as the new chair.

The rest of the session continued with a review of the proposed guide changes.

The WG will be organizing weekly conference calls to accelerate document revision – Action Farnoosh Rahmatian and Paul Myrda. The team will be coordinating the weekly conference calls with WG C4 since the two WG share several members/resources.

The Working Group is still planning on initiating the process to form a balloting pool at the earliest opportunity.

A double session with a room for 40 people and a computer projector is requested for the January JTCM meeting.

**C13: Undervoltage Load Shedding Protection**

**Chair: Miroslav Begovic**

**Vice Chair: Shinichi Imai**

**Output: IEEE Report**

**Established: September 2005**

**Expected Completion Date: May 2012**

The WG meet on September 14, 2011, in one session, attended by 2 members and 9 guests.

The WG report, which was sent to the SC members for balloting, has received only 18 ballots so far (16 positive and 2 negative). One of the negative ballots was verbally converted to positive during the discussion about the requested changes, while the other negative ballot, requiring a number of typos and editorial corrections to be done, will also hopefully become a positive ballot when the revision of the report is completed.

As most of the editorial changes are of non-substantive nature, re-balloting will not be needed upon corrections. It will be needed, however, to obtain 75 percent of the SC membership votes (current SC membership stands at 45, which means that for the minimum passing vote the report will need 34 votes, or at least 16 additional votes).

Once the report is corrected (during the month of October), the report and ballots will be sent once again to the SC membership with request to those who have not voted to send their ballots so that the process be completed. The plan is to conclude the process in January 2012 at the JTCM meeting and begin work on the summary paper(s).

Working Group is planning a meeting in a single session in January 2012. Room will be needed for 15 attendees and a video projector.

**C14: Use of Time Synchronized Measurements in Protective Relaying Applications**

**Chair: Jim O'Brien**

**Vice Chair: Alla Deronja**

**Output: IEEE Report**

**Established: May 2007**

**Expected Completion Date: Dec 2012**

**Assignment:** Produce a general report to PSRC Subcommittee C outlining practical protection applications using synchrophasors.

Working group C14 met on September 13, 2011, in Minneapolis, MN, in a single session chaired by Jim O'Brien with 4 members and 9 guests present.

The chair distributed the latest draft of the Report. The Report nears completion and requires final editing. A few outstanding issues were discussed during the meeting.

The title of Figure 2.1 on page 4 was proposed to be revised to *CT ratio correction factors* from original *Relative errors for metering and protection CTs*; however, it was decided to keep the title as is.

There was an issue with the limits of the data loss and the reference for the communication infrastructure requirements in section 3.1 on page 10. The sentence in question was re-written as follows: Dropout tolerance depends on a particular application and should be determined on case-by-case basis.

In section 4.12 on page 32, Jay Murphy will check with Ken Martin about the subsection 4.12.2 a), which is in question due to a statement that values of  $X_d$  and  $X_q$  (generator steady-state reactances) might vary with the generator operating conditions. Also, the introduction to this section will be dropped because its reference Standard C37.118.1 is not approved yet at this time.

It was decided that the topic on Synchrophasor application to controlled islanding, which was moved from subsection 5.12 to 5.10 would be a separate subsection. The chair will contact Demetrios Tziouvaras, who was supposed to expand on this topic, whether he would do so; otherwise, the new subsection will contain the present material.

Alex Apostolov was to contribute a write-up to address different synchrophasor measurements – for metering and for protection and latency and time synchronizing requirements for the protection synchrophasor measurements based on the IEC standard 90-5. The chair will contact Alex whether he would provide this contribution. If not received, this topic will be left out from the Report.

Other editorial comments by those present at the meeting were addressed.

The chair will incorporate the latest changes, edit, and recirculate the latest Report draft for approval by the WG members. It will then be submitted to the Subcommittee C, and the volunteers from the WG members will be needed to put together Power Point document for a presentation at one of the future PSRC Main Committee meetings. If any WG member would like to contribute to the Power Point presentation, please contact the Chair or vice-chair.

The next meeting in January of 2012 is requested to be scheduled and may be the last.

Requirements for the next meeting are as follows: single session, meeting room for 25 people with a computer projector.

**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)

Working group C-15 met on Tuesday, September 13, 2011 in Minneapolis, MN, in single session chaired by Yi Hu with 7 members and 7 guests attending.

During the meeting, the latest comments provided by the WG members and review team members on the latest draft report were reviewed and discussed. Members and guests also reviewed and discussed the latest additional contributions provided by working group members. Conclusions / resolutions on significant comments were as follows.

- In section 3.II RAS Requirements, it was decided to utilize milliseconds consistently instead of cycles.
- In the same section, it was clarified that the breaker failure time is included in the RAS operating time, and insulator contamination was included as one of the reasons of transmission line faults.
- Additionally, the term SIPS will be utilized throughout the Report, and other references such as RAS (Remedial Action Scheme) will be eliminated. This is consistent with the title of the Report and PSRC definition.
- In Section 4, Load Rejection, a comment was that the section is very generic and does not have a particular example like other sections do. A practical example needs to be included. Alex Apostolov, the original author, will be contacted for the example; also, Fernando Calero will try to provide one.

- Figure 2.1.4 is illegible. Mark Adamiak will be contacted to provide a better version of it.
- Also, a clarification will be added to the Introduction section by Yi Hu regarding presenting actual examples of SIPS in the Report, not a SIPS theory.
- A question regarding the centralized, localized, and distributed SIPS definitions was raised. A recently completed WG C4 report *Global Industry Experience with System Integrity Protection Systems* has these definitions, which need to be consistently followed. The WG members will review the C4 report and discuss the issue at the next meeting.
- Other comments were to define acronyms SCD and SCE (pp. 31-32) used in the Report.
- Also, a question of the difference between load rejection and load mitigation was raised. This issue is covered in Appendix A of the C4 report *Global Industry Experience with System Integrity Protection Systems*. Yi will add text to Section 1 defining the SIPS, which are described in the present Report.
- A subject of Optimal Power Flow is not mentioned in Section 2 although it is referred to Section 2 in Section 5. This needs a correction.
- The WG also discussed the newest contribution by Vahid Madani for subsection 2.4 Redundancy Considerations.

The latest comments will be implemented in the current draft of the Report, and a new draft will be put together and circulated among the WG members before next meeting. The members will need to review the document.

**Next step actions:**

Planned next step actions before January 2012 PSRC meeting are as follows:

- WG Chairs to follow on a few specific comments with respective section authors
- WG Chairs to create a new version of the draft report to include all new contributions, make necessary edits, and re-distribute it to WG members and review team members for review and comment
- WG members and review team members to review and provide comments
- WG Chairs to create a combined comments list for review and discussion at next meeting

The working group will meet at next PSRC meeting in one session to review the next draft of the report.

Requirements for Next Meeting – Room for 30 People, single Session, Projector, Power strip

**C16: Relay Scheme Design Using Microprocessor Relays**

**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.

Working Group C16 held its meeting on Monday afternoon with 17 attendees. Eleven working group members were in attendance.

Guest Brian Boysen has been added as a member.

The working group chair reiterated to the group that the intent of the report is to serve as a supplement to the much older trip circuit design report.

Draft 2.6 of the paper was discussed. Several sections of the paper were assigned for revision.

Ken Behrendt will look into section 4.4.1

The question was raised as to what to do with the final paragraph of 2.6.1 which doesn't belong. It may be placed with 2.6.2 concerning battery ground considerations.

Brian Boysen will revise figure 2.6.2 to add a logic diagram

Adi Mulawarman will rewrite section 3 to make the logic shown more vendor generic.

Don Lukach will rewrite section 2.7 on scheme complexity

Angela Higdon will add to section 3.3

All assignments are due by October 31.

Next meeting requirements: Single meeting, 30 persons, computer projector.

Request that the meeting does not conflict with the D6 and the I5 working group whose assignment is complementary to this working group.

**C17: Fault Current Contribution from Wind Plants**

**Chair: D. Miller**

**Vice-Chair: G. Henneberg**

**Output: Report by the Joint Working Group**

**Established: January 2009**

**Expected Completion Date: 2012**

***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.

***C-17 WG Assignment:*** To support the activities of the Joint Working Group on Fault Current Contributions from Wind Plants.

The Joint Work Group met in a single session at the PES Joint Technical Committee Meeting in Atlanta, GA on Wednesday January 11, 2011 with 10 members and 22 guests.

The Joint Work Group met in a single session at the PSRC meeting in Minneapolis, MN on Tuesday September 13, 2011 with 16 members and 10 guests.

Dean Miller reviewed the status of the report and writing assignments. Most writing assignments have been submitted, though 3 are still outstanding. Dean provided paper copies of version 4.0 plus a new submittal for section 3.4. The combination is draft 4.1. Assignments have been submitted for wind turbine Types I, II, IV, and V. Assignments are still pending for Type III and for Equipment Fault Current Interrupting Issues. The Introduction and Conclusion also have not yet been written.

Ron Harley and Dustin Howard from Georgia Tech have done extensive modeling work for Type I machines. Dustin presented the analysis and conclusions to the WG. Analysis was similar to earlier presentations for Type II turbines. Lab tests were performed on a 7½ HP wound rotor motor using both time domain and sequence calculations. PSCAD simulations were done for a 1.8 MW turbine. Results for three phase faults and the faulted phase for line-to-ground faults provided quite good agreement on methods. However, results for the unfaulted phases during line-to-

ground faults were quite sensitive to negative sequence values and other parameters. Charlie Henville suggested that generator per unit quantities also be presented to improve clarity.

There was a brief review of the new material in section 3.4 for the type 4 turbines. It was discussed at that for the analysis of all types of turbine/generators that both faults on the generator terminals and the high side of the generator transformer should be discussed in the report.

The next Joint work group meeting will be at the PSRC meeting in Garden Grove, CA, January 9-12, 2012. Requirements for this meeting will be: single session, room for 50 with a computer projector.

**CTF3: Joint meeting with Power System Stability Controls Subcommittee**

**Chair: C. Henville**

**Vice-Chair:-**

**Output: Proposals for working with Power System Dynamic Performance**

**Established: January 2010**

**Expected completion date: TBD**

CTF3 met in Minneapolis with two members present.

A joint panel session with PSDP at the PES GM in July 2012 is now confirmed. Alex Apostolov will be the representative with Pratap Mysore being backup person.

The PSRC presentation will be `Protection issues during system restoration`, and will be based on the PSRC transactions paper that was published in 2005 but with updates with respect to changes in technology. These updates will not be published in the printed paper which will simply be the Transactions paper, but will be included in the presentation.

Some possible impacts of modern technology that are not fully discussed in the Transactions paper but could be included in the update are:

- Alternate settings groups to be enabled during system restoration
- Synchrophasors in synchronizing during system restoration
- Modern frequency tracking capabilities during frequency excursions
- Adaptive settings
- Enhanced visibility due to monitoring capabilities of modern IEDs

In addition, outside the CTF3 meeting, discussions with Ken Martin led to the idea of proposing a panel session at the July 2013 PES general meeting to be sponsored primarily by the PSRC but with the cooperation of the PSDP on the new synchrophasor standard(s) and applications of synchrophasors for SIPS. This will be developed further at the January PSRC meeting.

**CTF18: Transmission to Generation Interconnection Protection Considerations**

**Chair: Alla Deronja**

**Vice-Chair:-**

**Output: IEEE Guide**

**Established: September 2011**

**Expected completion date: TBD**

Task Force CTF18 met on September 14, 2011, in Minneapolis, MN, in single session chaired by Alla Deronja, with 30 people present.

The chair presented the task aiming at writing an IEEE Guide for the transmission to generation interconnections. This topic has not been rigorously approached by the industry yet. The purpose of the new Guide is driven by the fact that many power producers, being connected to the power

grid, may fail to install the adequate protective equipment at the interconnection because of the limited expertise of their consultants or desire to decrease the cost of the facilities.

A discussion was followed to identify the potential conflicts with other working groups. The task force determined that there was no credible conflict between the present work and WG J3 (*Power Plant and Transmission System Protection Coordination*) and K4 (*Revision of C37.95 Relaying of utility-consumer interconnections*).

However, Gerry Johnson brought an issue with SCC21 IEEE P1547.5 Draft *Technical Guidelines for Interconnection of Electric Power Sources Greater than 10MVA to the Power Transmission Grid*, which appears to duplicate the effort of this task force. According to Gerry, this group's work has been stalled for 6-7 years with no progress made, and their current PAR will expire soon. The plan is for Gerry and the task force chair to get in contact with P1547.5 chair and secretary to resolve this conflict before moving forward with this project.

The title for the future Guide, if cleared for progress, was approved to be *IEEE Guide for Protection Systems of Transmission to Generation Interconnections*. Also, the scope and purpose were proposed and discussed. They stand as follows at this time:

Scope:

This Guide contains information on recommended protection of transmission to generation interconnections. It is intended to cover the protection system applications at the interconnections between the transmission systems and generation facilities.

This Guide is not intended to supplant specific transmission or generator owner practices, procedures, requirements, or any contractual agreement between the transmission and generator owners.

This Guide will be coordinated with IEEE Std. C37.95 IEEE Guide for Protective Relaying of Utility-Consumer Interconnections.

Purpose:

This document is intended to provide guidance to those who are responsible for the relay protection of electrical interconnections between transmission and generation facilities.

Depending on the conflict resolution with P1547.5, a second task force meeting in January of 2012 is requested.

Requirements for the next meeting are as follows: single session, meeting room for 20-30 people with a computer projector.

**D: LINE PROTECTION SUBCOMMITTEE**

**Chair: R.W. Patterson**  
**Vice Chair: G.L. Kobet**

The Subcommittee meeting was called to order at 3:00 p.m. with 31 members and 19 guests present.

Following introductions, a count of SC membership was made, and it was determined a quorum was present (31 out of 46 members present).

Minutes from the May 2011 meeting in Asheville were approved.

Chairman Patterson reported items of interest from the Advisory Committee.

**Reports from the WG Chairs:**

**D2: Revision of C37.104 Transmission and Distribution Reclosing Guide**

**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 and AC Distribution and Transmission Lines

Working Group D2 held its meeting on Tuesday, September 13, 2011, in a double session. There were 26 WG members present and a quorum was achieved. Fifteen guests attended the meetings. WG membership stands at 34.

The IEEE patent requirement slides were presented, and attendees were given the opportunity to identify any known patent claims. The working group discussed a submittal that is being reviewed for a patent claim between manufacturer and IEEE. This information has been removed from the document until letter of assurance is received, which is required within the next 3-4 months.

The D2 meeting notes from the May, 2011 meeting held in Asheville, NC were reviewed and approved without modification.

Chair Kobet reviewed the timeline and stated that the goal is to finalize the document by December 2011 so that the Sponsor Ballot can open in January 2012. According to this current schedule, the document would be submitted to RevCom in May 2012.

Working group member technical comments on draft 5.0 of the guide were reviewed. Chair Kobet recorded many of the resolutions of comments in the draft guide -- other specific comments that require follow-up include the following:

- Verify the correct usage of "should" throughout the guide.
- Add information regarding the percentage of faults that have successful autoreclose from the T&D book (if it doesn't already exist in the guide).
- Verify the use of the term "Clause" instead of "Section" throughout the document.
- Verify clause references within the guide are valid following the elimination of various clauses.
- Pratap will edit clause 4.6.2 (Circuit Breakers) and email to the chair for inclusion in the guide. Gary will email Pratap the revised text for this section as a result of the meeting.
- Revise clause 4.5 to consolidate list of conditions into a single list of situations when autoreclosing is blocked.
- Update Figure 1 by renaming the "79/on-off" contact label to "reclose on-off". In addition, update the text that references Figure 1 to better clarify how the circuit operates.

Chair Kobet will set up a teleconference within the next few weeks to address those comments that could not be covered during the working group session. The entire working group will be invited.

**D3: Considerations in Choosing Directional Polarizing Methods for Ground Overcurrent Elements in Line Protection Applications**

**Chair: Meyer Kao**

**Vice Chair: Elmo Price**

**Output: Report to the Line Subcommittee of the PSRC**

**Established: September 2009**

**Expected completion date: Jan 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 Monday September 12th, 2011 at 4:30 PM with 18 attendees, of which 6 are guests

Minutes from the Ashville 2011 meeting were approved with no changes.

Writing assignments assigned from the previous meetings were discussed.

The subject of polarizing considerations for series compensated line was discussed. Suhag Patel has volunteered on taking on a writing assignment regarding this subject.

Normann Fischer will provide the working with a technical paper on mis-operation regarding mismatch of relays in Australia.

The working also discussed the subject of the behavior of adjacent lines where one line had single pole tripped. It was decided this is not a polarizing issue, but rather than a operating sensitivity issued. Russ Patterson agreed to write a short section regarding this condition.

The working group decided to include a section on how various short circuit software, such as Aspen and CAPE, model the polarizing methods for different relay models.

The assigned writing assignments are due on October 31.

**D6: AC Transmission Line Model Validation**

**Chair: Tony Seegers (not present)**

**Vice Chair: Sam Sambasivan (Acting Chair)**

**Output: Report to PSRC**

**Established: January 2009**

**Expected completion date: May 2013**

**Draft: 1.5**

**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 draft version 1.5 was sent to all the members prior to the meeting.

Discussion took place regarding the missing sections and the contributions required to make the report complete.

John Miller will provide contribution for the Section on "Required accuracy" and George Bartok will provide the contribution for the section on "Effect of Modeling assumptions".

The contribution provided by Demetrius Tziovarus for the section on Special considerations with modeling cable will be reviewed by Sam Sambasivan and Pratap Mysore and a condensed version appropriate for the report will be included in the draft. Norman Fischer mentioned about the recent paper written by Gerry Roselini on Validating Cable Models and he will send a copy of the paper to review and decide whether this can be included as an Appendix to the report.

Joe Uchiyama will resend the shortened version for the Section on "Other considerations affecting use of the Model".

All contributions are due by end of October. The final draft of the report will be sent to all the members prior to the next meeting. The review of the final draft will be taken up during the next meeting.

**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 5.4**

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

**Assignment:** Revise and update IEEE Standard C37.113-1999 (reaffirmed 2004) Guide for Protective Relay Applications to Transmission Lines

This working group has been disbanded. See "New Business".

**D11: Effect of Distribution Automation on Relaying**

**Chair: Fred Friend**

**Vice Chair: Jerry Johnson**

**Output: Report to the PSRC**

**Established: January 2005**

**Expected Completion Date: September 2011**

**Draft 6.5**

**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 10 guests present. Minutes from the May meeting in Asheville were reviewed and approved without comment.

The document was reviewed and discussed as follows:

Discussion on Tie switches and Sectionalizing switches. Define each in definitions and provide consistency throughout the document.

Jay Sperl suggested that Clause 2.3 bullet items are too complex. He will reword each and submit.

Clause 2.3.1, headers are in different fonts, some figures do not have names 6.3, 6.4 and check all figure numbers. Fred will check entire document for formatting and figure corrections.

Charlie Sufana comment of "rudimentary" electromechanical. Put in definitions or acronyms and replace all with EM.

Clause 3.1 discussion on normally open NO and normally closed NC. Fred to add parentheses and check for consistency.

Clause 3.6.2 submittal to replace existing fault location, much discussion and word smithing. Wayne Hartman will submit changes to clear up confusion.

Juan Gers will supply a few paragraphs for Clause 3.6.3 on setting group changes.

Clause 4.6.7, Jerry Johnson will provide comments on 1547.2 and .3.

All writing assignments are due by September 30. Document will then be sent to the working group for review / comments.

**D21: Support of IEC Standard 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, 2011, in Minneapolis, MN, in single session chaired by the vice-chair, Alla Deronja, with 5 members and 1 guests present.

Murty Yalla, the chair of the IEC TC95 MT4, provided an update on the IEC 60255-121 standard development progress. More than 100 pages of comments have been received from the IEC member national committees, many of which were from the USA and Canada national committees. Bogdan Kasztenny and Normann Fischer attended the MT4 meeting in Seattle in the fall of 2010. At that time, the USA comments, which were collected and provided by the WG D21, were addressed.

The second committee draft CD2 was produced for the IEC TC95 MT4 meeting in Austria in May. After the meeting, additional 27 pages of comments were received. During the last week's MT4 meeting, most of the latest comments were resolved.

Murty reviewed comments received from Canada. Many technical comments were accepted. Other significant technical comments were received from Hungary.

The next draft CDV of the standard should be ready by the end of October. It will be re-circulated among the IEC member national committees. It will be also distributed to the WG D21 members for review and any additional comments. Everyone is encouraged to submit any further comments to the WG vice-chair so they can be sent to Murty for consideration.

Comments from the draft CDV of the standard will be addressed at the next MT4 meeting in London in December. After that meeting, a final draft CDV will be produced by the end of January of 2012 and circulated for voting by the end of February. The votes will be received by May of 2012. Upon the 75% of the positive votes, the standard will be published by the end of 2012.

The WG will hold the next meeting in January of 2012. A meeting in May of 2012 may be the last of the WG.

**D22: Performance Testing of Transmission Line Relays for Frequency Response**

**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 used in a performance specification for protective relay functions. The WG will develop a test process for transmission line relays subjected to off-nominal frequency disturbance including the rate-of-change of frequency during stressed system conditions.

The D22 working group met Wednesday September 14, 2011 at 8:00 am at the Hyatt Regency Minneapolis with 9 members and 8 guests. WG stands at 26 members.

The responses from the D SC ballot were discussed. Of note was the resolution of the ballot from Dean Miller. This resolution resulted in the development of the report's Annex and an additional

paragraph within section 4.0 Impact of System Frequency Excursions on Distance Functions with Memory Polarization. These report changes serve to explain further the functionality of memory polarization as it relates to power system frequency excursions.

The WG believes it has completed its assignment and with these minutes submits the report and the Comtrade Calculator to the SC. The WG recommends that these documents be sent to NERC via the PSRC chairman's letter thus completing the PSRC work as requested by NERC.

The WG chairman expresses his gratitude to the WG members for their expertise and hard work on this assignment. The WG chairman also expresses gratitude to the SC members who provided such great comments.

D SC Chair informed us that the report will be Special Publication. A Special Publication requires a ballot approve of 75% of both WG and SC. I will highlight any changes made to document since last ballots and re-ballot. I will also send draft to Mel Swanson for terminology review.

**D24: Transmission Line Applications of Directional Ground Overcurrent Relays**

**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 2012**

**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 (WG) met with 14 members, 13 guests, for a total of 27.

The May, 2011 meeting minutes were approved as submitted.

The WG decided to remove the terms "POC" (Point of Coordination) and "Hi-Impedance" from the text as conceptually, the methodology is contained within the document without the need for the additional terminology.

The WG discussed the application of stepped-definite-time, over-current coordination. The concept is similar to step-distance impedance schemes, but was not in use from any in attendance. The WG decided to not include this subject in the report.

The WG discussed 50N setting methodology, including an example where the 50N reached into a remote bus fault. The line-end breaker was the slowest bus breaker at the remote end, and thus, the fault appeared as a line-end fault.

The WG discussed technical comments received on Draft G of the report.

Writing assignments include the following, and were requested by 10/31/2011:

- Electro-mechanical vs. micro-processor margin differences
- Enhance Section 5.2.1 with 50N tolerances
- Enhance contingency analysis section to discuss TPL changes
- Add additional example of 51NT pickup methodology

The output from the WG was originally an input into the D9 working group. The D9 group was disbanded, and a new WG D19 formed. Thus, the D24 WG will need to re-submit the original summary to D19.

**D25: Distance Element Performance with Non-Sinusoidal Inputs**

**Chair: Karl Zimmerman**

**Vice Chair: Aaron Martin**  
**Output: Technical Report to Line Protection Subcommittee**  
**Established: January 2009**  
**Expected completion date: January 2012**  
**Latest Draft: 1.2**

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

The working group met in Minneapolis on September 13, 2011 at 8:00 AM with 8 members and 9 guests. Introductions were followed by a review of the May meeting minutes.

The working group reviewed comments to Draft 1.2 from Charlie Henville and from the Chairman. We incorporated several comments, in particular, Charlie's general comment to avoid using the term "recommended" or similar. Instead, the WG agreed to offer solutions in light of protection security and/or dependability.

Each section was reviewed. Some of the following changes were agreed to:

- Add description of quadrilateral elements, directional elements, and supervising conditions to distance element design, Section 2 (Joe Mooney, example from Don Sevick).
- Eliminate redundancy to section on transformer magnetizing inrush (Karl Zimmerman, Elmo Price)
- Add example of CVT transient on directional element (Zimmerman).
- Reduce sections on windpower to short description. We agreed there is not enough data to describe problems and solutions. Will refer to Dean Miller Working Group on fault models of wind sources and try to identify other references, if available (Russ Patterson)
- Fix figures from Transients section to make more legible (Yuan Liao)
- Add description of line voltage ring down impact on distance relays to Transients section. (Fischer)

These assignments are due by November 20.

The Chairman will incorporate into a new draft, put into IEEE format and send out to WG review by December 10. All members are invited to review, but specifically John Wang and Yuan Liao, and Eli Pajuolo agreed to review for consistency. Their reviews should be complete in time for the January 2012 meeting

**D26: C37.114 Fault Locating Guide Revision**

**Chair: Joe Mooney**  
**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 28 attendees with 13 members and 15 guests. There are 25 members on the Working Group so a quorum was achieved.

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

The slides 1-4 of the IEEE Patent Policy were reviewed by the group. The chair provided an opportunity for the group to identify patent issues. There was no response from the group.

Action items from the last meeting were reviewed. None of them have been submitted. They are listed below for reference. The group revisited and had a good discussion on the definition of error

for fault locating. It has remained one of the most controversial issues given the following definitions:

Traditional definition:  $[(\text{true value} - \text{measured})/\text{true value}]$ .

C37.114 definition:  $[(\text{measured} - \text{true value})/\text{line length}]$ .

It was suggested that multiple error definitions can exist, depending on the intended use. Tony Giuliani outlined a framework for a new section to discuss error definitions in more detail. It will include definitions, uses, sources, advantages and industry practice. It was agreed that this was a good approach. Damier Novosel, Karl Zimmerman and Tony Seegers volunteered to submit a draft of this new section.

There was discussion on the issue of fault locating on series compensated (SC) lines. The WG should add content to provide more details on the issues and problems and provide information on methods that may be applicable to SC lines. The WG chair mentioned that many west coast utilities with SC lines are using travelling wave methods successfully.

The possibility of expanding the section for synchrophasor applications was questioned. Randy Cunico volunteered to investigate the work and progress of C14: Use of Synchrophasor Measurements in Protection Applications with its chairman, Jim O'Brien.

The other working group assignments as noted below were reviewed with members in attendance. Please complete working assignments and send them to the WG chair by December 2, 2011. As a reminder, working assignments are as follows:

- Damier Novosel, Karl Zimmerman and Tony Seegers: Draft a new section for the guide describing error definitions in more detail. It should include definitions, uses, sources, advantages and industry practice.
- Rafael Garcia and Mansour Jalali: Explore updates in methods and technologies for fault location on series compensated lines.
- Mladen Kezunovic: Draft a section on data sources for distribution fault location by next meeting.
- Mladen Kezunovic: Develop a table outlining the pros and cons of the different fault location algorithms.
- George Bartok and Meyer Kao: Write a section expanding on the issues related to the errors introduced by nonhomogeneous lines.
- Randy Cunico: Explore the use of synchrophasor technology in fault location with C14. Propose additional coverage in this guide.
- Brian Boysen and Pat Carrol: Draft a section describing the WE Energies distribution fault locating application for the review by the WG.

Action Items for next meeting:

Complete and submit WG assignments to WG Chair by December 2, 2011.

Bring new ideas in fault locating.

**D27: PC37.243 Line Current Differential Guide creation**

**Chair: Ryland Revelle**

**Vice Chair: Solvieg Ward**

**Output: IEEE Guide PC37.243**

**Established: May 2010 (PAR approved)**

**Expected Completion Date: December 2014 (PAR expires)**

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

This meeting was attended by 18 members and 6 guests. A quorum was not obtained (52 total WG members) and the meeting minutes from May will be approved via email.

A draft had been completed since the May meeting. Assignments to complete Missing sections and to review existing sections were handed out. Contributions are due to the Chair by October 31. The Chair will reformat the document using SA's standard template.

The Chair explained how to use the IEEE SA MyProject site and all WG members need to sign up. Drafts and contributions will be posted on this site.

The objective is to have a draft guide ready for balloting by January 2013 in order to complete the work before the PAR expires

### **Coordination Reports**

None

### **Liaison Reports – Fred Friend**

T&D Committee / Distribution Subcommittee

The next T&D Committee / Distribution Subcommittee meeting will be at the IEEE Joint Technical Meeting in Garden Grove, CA, 9 – 12 January 2012.

The following are items of interest to the Line Protection Subcommittee from the 2011 IEEE PES General Meeting in Detroit, MI:

Working Group on Distribution Automation

<http://grouper.ieee.org/groups/td/dist/da/>

George Simard, Chair

Larry Clark, Vice-Chair

Bob Uluski, Secretary

Proposed panel session at the 2012 General Meeting in San Diego: "Smart Initiatives Produce Smart Innovations"

Continue discussions on developing Distribution Automation publication EPRI/ IEEE Guide on Smart Distribution

Working Group on Switching & Overcurrent Protection

<http://grouper.ieee.org/groups/td/dist/sop/>

Lee Taylor, Chair

Fred Friend, Secretary

Continued work on P1806 "Guide for Placement of Overhead and Underground Switching and OCP Equipment"

Scope: This guide is to provides criteria for switching and protective device placement for distribution circuits.

Purpose: This standard develops a guide for where and when switching and overcurrent devices are placed on the distribution system.

Discussed creating a Distribution Overcurrent Protection Philosophy and Practices Guide.

### **Old Business**

None

### **New Business**

The Chair thanked Moh Sachdev for his leadership and service in chairing the D9 Working Group which was responsible for the revision of the C37.113 Line Protection Guide. Due to the PAR expiring at the end of 2011, and the indications that an additional PAR extension would not be

granted by IEEE-SA, the PSRC officers have recommended withdrawal of the PAR, and the initiation of a new PAR. The Subcommittee voted (30 approved, none opposed/abstained) to disband the D9 Working Group for this reason, and voted (30 approved, none opposed/abstained) to reconstitute the group as Working Group D19, with Rick Taylor as Chair. The D19 Working Group will take the document in its most recent draft and proceed.

### **General Discussion**

Matt Ceglia discussed the reasoning for presenting the patent slides in each standards-related working group meeting. Once the Working Group Chair issues a request for an LOA, the WG Chair is no longer involved in the process.

### **Line Protection operations of interest**

Fred Friend discussed distribution operations involving the use of distributed generation.

The meeting was adjourned at 4:15 p.m.

## **H: RELAYING COMMUNICATIONS SUBCOMMITTEE**

**Chair: V. Skendzic**

**Vice Chair: Eric Udren**

The Subcommittee met on May 19, 2011 with 28 members of 38 total, plus 28 guests. This comprised a quorum. Minutes of the January 2011 Atlanta meeting were approved.

In general announcements, the SC Chair asked WG Chairs to avoid double sessions when possible, due to scheduling challenges of the PSRC Secretary. Also, WG chairs should bring copies of documents for discussion by guests.

### Old business:

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.

Several SC H working groups completed their work and disbanded – H8, H10, and H15. With pipeline space cleared, the SC discussed the creation of two new task forces for potential activities that had been on hold in this queue:

- HTF1 – Functional testing of IEC 61850 based systems – Alex Apostolov, Chair
- HTF2 - Condition Based Maintenance in IEC 61850 – Definition of Protection System (Secondary System) Models. – Paul Myrda may be able to serve as Chair, with Rene Midence as Vice Chair.

### New business:

- The SC discussed the creation of a WG to develop a phasor data concentrator (PDC) standard, based on the results

### **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 9 members and 5 guests. After introductions, an agenda with the IEEE patent policy was distributed. We will ask members for approval of the January minutes via email in the coming weeks. For the 4 new attendees, a review of the scope and purpose of the working group and guide was covered.

Section 7.7 was highlighted as a recent contribution by Bryan Donaldson was added to the existing section. The new section is very technical and requires some links from the problems stated to the conclusions of the author. It was also determined that some areas are stated as fact when they might be described as possible outcomes or local practice. An introduction was also determined to be required including a statement about leased lines usually ending up in a digital network. Mark Simon has agreed to make the changes to this section.

The rest of the document was reviewed for the necessary additions and changes and they include:

1. Section 9.1 part a, Planning, Leased Lines, Jim Ebrecht to review and add mention of leased analog lines being part of phone companies' digital network and digital leased lines, DDS.
2. Section 10.3, Alarms, Marc Benou will add "yellow" alarm, local and remote loopback, and Ping test alarms.
3. Section 5.3, Bob Ince to review and finish. 5.3.1.8 and add a short introduction.
4. Section 5.3.1.9, the chart needs baud rates down to 1200 baud added. Bob Ince was volunteered.
5. Section 7.4.5 and 7.4.5.1, to be reviewed and possible have an introduction added by Rafael Chapparo.
6. Section 7.4.6, drawing to be reviewed by Tom Dahlin.
7. Section 7.6, needs new drawing. Will work with Soo Kim from IEEE on this.

All work to be completed and returned to the chair by the 3rd week of June.

The question was asked if the guide needs a conclusion. It was determined to leave it out for now.

H1 has been offered help by IEEE as a smart grid working group. The intention is to use their expertise to conclude the work on the guide and go to ballot either before the September meeting or shortly thereafter. The members present agreed to try the monthly web meeting as proposed by Chairman Benou.

## **H2: Relay Applications Using the Smart Grid Communications Infrastructure**

**Chair: M. Simon**

**Vice Chair: G. Antonova**

**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 Tuesday May 17th 2011 with 48 people in attendance. 10 members and 38 guests. This is not a standards effort that requires a quorum.

The working group reviewed the latest draft which was emailed prior to the meeting to members and guests that have previously attended. Upon receipt of the two additional writing assignments the draft will go to the working group members for consensus via email. Upon resolution of any outstanding items, the document will be web published and the assignment will be complete.

The latest draft will be sent to all working members and guests that have attended any previous meetings. Anyone that would like to see a copy of the draft, please contact either the chair or vice-chair.

### **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 meeting was called to order at 4:40 pm. 10 members and 7 guests were present and quorum was not achieved. The approval of minutes will be addressed by emailing Working Group members. A call for patents was made. No new holders of potentially essential patents were declared.

Discussion of PAR modifications (title, scope and purpose) to enable the formation of a joint WG with Substations Committee:

- Matt Ceglia, IEEE-SA, suggested that the working group discuss modifications to the existing PAR to create a new PAR that would be acceptable to both committees, for the formation of a joint working group. The modified Scope & Purpose can then be ratified by the working group via email ballot.
- The group discussed and modified the Scope & Purpose. The updated document will be circulated within the working group for approval. The working group will also be asked to approve the formation of a joint working group with the Substations Committee.

### **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 meeting was called to order on May 17 at 1:40 PM. 13 voting members were present along with 4 guests and quorum was not achieved. A call for patents was made. No new holders of potentially essential patents were declared.

The group reviewed the comment resolution spreadsheet. Proposed changes were recorded in version 2. The group reviewed comments #12 to # 81. Chair Das will circulate the updated spreadsheet (version 2) and draft "e" of "60255-24\_CD-rev3e" for WG balloting along with resolution of comments done by other members prior to balloting. This ballot will also include comments resolution from IEC countries. Once approved, the revised draft will be used for IEEE recirculation balloting along with CDV by IEC. IEEE SA will coordinate with IEC to synchronize the dates. CDV duration is five months. It is expected that CDV process will be complete by October, 2011.

### **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. The nesting of functions independent of the distance function but used as a sub function was discussed (like pick up, or directional element). The problem of having settings used only by one manufacturer was discussed and will become addressed with the definition of private settings.

The working group will give feedback to PAP14 on the progress of the report.

The schedule is planned as following:

First draft version for distribution:	16 June	Apostolov/Holbach
Review of first draft:	30 June	Price/Richards
Second Draft:	30 July	Apostolov/Holbach
Review of second draft:	30 August	Price/Richards
Third/final version	September meeting	

**H6: Substation Ethernet**

**Chair: C. Sufana**

**Vice Chair: B. Vandiver**

**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 Benton Vandiver, who volunteered to be the vice chair last week and conducted the meeting. Chair Charles Sufana was unable to attend the meeting but will return at the September meeting. There were 8 members and 30 guests present. Two requests for membership are pending chair approval. The minutes from the January 2011 meeting were reviewed and approved with no comment.

A review of the assignment was made and the need to establish a list of topics to structure a report was made. The group discussed this at length and a list of 20 topics were captured that will be organized and distributed before the next meeting in outline form. Many issues facing the industry in testing were identified where the WG can definitely contribute to clarifications, definitions, and test methods for these systems.

Herb Faulk presented a review of the SCE white paper "Standardized Testing Philosophies & Methods" as applied to SCE's C-RAS project. Both the white paper and PPT will be distributed to the WG as background info for the WG report.

**H7: IEEE 1588 Profile for Power System Applications  
(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 May 18, 2011 in Asheville, NC in a single session with 42 attendees (14 members and 28 guests). 14 attendees (3 members and 11 guests) called in and participated via on-line meeting. Quorum was achieved. After introductions, co-chair presented IEEE Patent Policy slides and asked to bring up any patent issues. None were identified. Minutes of January 2011 meeting were approved.

Co-chair gave a project update to the Group:

- Last Recirculation 3 completed with one "must be satisfied" comment.
- PC37.238 was submitted to RevCom, and is on June 16 meeting Agenda (for approval).
- Preparation for publication is in progress.

Discussion the Recirculation 3 comment followed, the comment is on a description of Time Inaccuracy concept. A description in a form of a summary / white paper or in the next revision was discussed and supported. A response to the comment was proposed and discussed. Alex

Apostolov moved and Chris Huntley seconded the motion to approve proposed response. The vote passed anonymously (14 in Favor). It was agreed not to make any changes to the current PC37.238 Draft D5.8. Comment's response will be provided to IEEE and to the balloter.

A short discussion on next steps followed, including revision / amendment plans, a summary paper and testing.

**H8: Application of COMTRADE for Exchange of Synchrophasor Data**

**Chair: E. Allen**

**Vice Chairs: J. Ingleson, K. Narendra**

**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 May 17 at 11:00 AM in Asheville, NC. 5 of 16 Members were present. There were 7 guests, for a total attendance of 12.

The consensus of the members present was that the testing done to date on the schema was satisfactory and therefore that the WG has completed its assignment. A quorum of the WG subsequently voted unanimously by e-mail to disband.

The assignment is complete and no further minutes from this group will appear.

**H9: Understanding Communications Technology for Protection**

**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 H09, Understanding Communications Technology for Protection, met in the Salon A, Renaissance Asheville Hotel, Asheville, NC, USA on May 18, 2011 at 9:30 am. eleven (11) members and nineteen (19) guests were present. For the benefit of new participants that attended the meeting for the first time, René Midence provided an overview of the Report, and presented a list of comments made to Draft 4.1 distributed after the previous meeting. René Midence explained that it was not possible to complete the document as it was agreed in the meeting of January 2011.

René Midence presented the status of the new Draft 5.1 and provided a detailed description of the content that was added to resolve some of the comments made to Draft 4.1. He pointed out that there are a few sections that need contributions to resolve outstanding comments made to Draft 4.1. The list of outstanding contributions will be distributed to the participants after the meeting. René reiterated that there is still work to be done that requires the skills of individuals with experience in communications with good understanding of protection and control. Prior to the meeting, René contacted some individuals who volunteered to assist, but their contributions were not received prior to the meeting. René will follow up with them and will collect their contributions. The following points were agreed:

1. The document will be structured as follows:
  - a. Acronyms
  - b. Part I – Detailed examples of different communications scenarios directing the reader for additional information to sections grouped in Part II
  - c. Part II – Detailed Information on Communications
  - d. Bibliography

- e. References
  2. It was recommended to build a good Bibliography and Reference list that will become key elements in this report.
  3. Add in Part I information on what was the motivation for the creation of the report:
    - a. The need for P&C Engineers and Technician to be able to interact with their communications counterparts.
  4. Add ½ to 1 page on XML
  5. Add a list of Acronyms at the beginning of the document
- The following participants volunteered to review the document: Vajira Pathirana, Adam Gauci, Simon Richards, Stephen Trachian, Tony Leszczynski, Sukumar Branhma (Sections 1 – 2), Stephen Bettschneider (Section 1).

New contributions and comments are due on June 30, 2011. Based on the status of the document, René suggested that finishing the document prior to the meeting of September 2011 is achievable. René expect to have Draft 6 ready for voting via e-mail by before the next meeting.

#### **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 WG has completed its assignment and disbanded. No further minutes will appear.

#### **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 Wednesday, May 18, 2011 in a double session with 14 members and 26 guests. The attendees were reminded of the applicable IEEE intellectual property rules. The WG had a quorum and the minutes were approved.

Liaison work with IEC was reviewed. The IEEE proposed PC37.118.1 to IEC TC95 for dual logo adoption. TC95 counter proposed a joint development which was agreed to by IEEE. The work was started on Monday, May 16 in a joint work group under the IEC new work project 95-277NP. The group discussed how the work should proceed, and decided to wait for approval of the current draft IEEE standard, and then create a new PAR for the joint work. The majority of group members are from this H11 group. The joint development plans team to remain as consistent as possible to the current 37.118.1 standard.

The present state of the standard was reviewed. In April the WG voted to pass the standard to PSRC for approval and forwarding to IEEE-SA for balloting. IEEE-SA has opened the ballot pool so the invitation is open. All H11 participants are encouraged all to participate in the ballot. The invitation closes June 1, 2011. 74 balloters have signed up as of 19 May. The approved draft was also sent to IEEE-SA for editing and formatting and the edited version received back on May 3. This version has been circulated to the WG.

A question was raised about the 2.7 cycle response requirement for the frequency measurement. In an earlier draft it was 4 cycles. With the last few editions it was trimmed to 2.7 cycles. This number was determined from the actual reference algorithm response plus 25%. This tighter

requirement could force making phasor estimates more often than some vendors currently do. The implications were discussed including obsolescence of equipment, update of equipment, producing consistent and usable measurements, and application requirements. A proposal to change it back to 4 cycles was made but failed pass, having 1 yes, 8 no, and 5 abstain votes among WG members present. Several WG members plan to investigate the implications of this in more detail. Changes can be made based on comments in the ballot.

## **H12: Configuring Ethernet Communications Equipment for Substation Protection and Control Applications**

**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 May 17, 2011 with 6 members and 24 guests. Attendees reviewed Draft 10 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. The schedule is to have the holes filled by September, with paper ready in January. All members and attendees are asked to review and mark up Draft 10. Items assigned at current or prior meetings:

- Items marked within Draft 10.
  - IEEE 1588 impact, advantages and disadvantages – R Harada.
  - Synchrophasors over Ethernet - Eric.
  - Addition on approaches to multiport relays with bumpless network failure handling – PRP, HSR – digest from 61850-90-4 draft – Clemens Hoga will fill in for former assignees.
  - Pointer to contents of new IEEE 1615 – Mike Dood
  - Security aspects of IPv6 – Didier Giarratano
  - Routers & dynamic routing – Richard Harada and Abdul Amin.
- 
- Herb Falk gave a presentation on results from the first UCA IUG Interoperability Test session in Paris in March 2011. There were surprises, especially in Ethernet networking:
  - Use of VLAN 0 causes some switches to remove the VLAN/Priority tag from the packets.
  - Highly meshed networks had problems
  - Auto-negotiation must be on
  - RSTP recovery time can be radically affected by position of route switch in mesh
  - Some switch vendors found interoperability problems to fix.
  - It is valuable to configure and test a network setup in the lab before field application.
  - Herb's presentation will be posted with the minutes.

## **H13: Understanding Requirements and Applications of the Substation Cyber Security Standards (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 meeting was held on Wednesday, May 18th with 41 attendees, 12 members and 26

guests and 3 IEEE-SA staffers. IEEE Patent Policy was announced. The chair was transferred from Steve Kunsman to Sam Sciacca due to changes in Steve's work responsibilities. Steve efforts as chair in the organization and work are reflected in the excellent progress of the project to date and the Working Group is extremely grateful for his leadership and contributions.

The accelerated status of the standard was discussed, with IEEE-SA offering to provide assistance in the timely completion of the effort. A revised schedule was outlined with the following major milestone targets:

- First Sponsor Ballot – Feb 2012
- Submission to RevCom – May 2012
- Expedited Publication – July 2012

Soo Kim of IEEE-SA announced that there is a Mentor site established for the project and offered to hold a training session for the WG membership. This will likely be done via webinar so that the members can begin uploading content to the site as it is created.

The remainder of the meeting was focused on review of the draft with regards to areas which need contribution. Additional assignments were made based on members volunteering to fill in gaps in the document. The entire Draft will be posted on Mentor for peer review. The meeting concluded shortly after the first session with the second session time used to update the Substations C10 working group meeting in Chicago via Live Meeting. Additional work assignments were made based on C10 membership interest/experience.

#### **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 Asheville. H14 was placed in an inactive status at the September 2010 meeting, 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). IEEE C37.115 has been removed 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: B. Pickett**

**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 May 2011 meeting. The paper is complete, successfully balloted by the working group, and presented at the Georgia Tech Protective Relaying Conference.

The working group is disbanded and no further minutes will appear for this group.

#### **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.

No minutes provided. The IEEE Standard for a Common Format for Event Data Exchange – COMFEDE – IEEE C37.239 – is complete, approved, and published as a full standard. The WG is developing a Transactions paper and a Conference paper. A first-draft PowerPoint is already available. An outline has been prepared and writing assignments have been made.

**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.

No minutes have been provided. Chair Christoph Brunner was absent from the Asheville meeting; Vice Chair Alex Apostolov ran the meeting and gave a brief verbal report for the SC H meeting.

**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 time with 15 members and guests present (no quorum was established). The latest draft (4.0) was reviewed and the attending members provided presentations on their assignments. So far 8 out of the 10 different types of files identified by the working group as protection related have been addressed. The remaining 2 file types will be addressed electronically and the final draft will be circulated to the members before the next meeting.

The group will meet again at the next PSRC meeting. The objective of the meeting is to review and vote on the final draft of the report.

**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.

WG H19 met on Wednesday, May 18, 2011 in a double session with 11 members and 30 guests. A quorum was present and the January minutes were approved. The participants were reminded of the applicable IEEE intellectual property rules. The chair gave an overview and status of 61850-90-5 which is the new addition for synchrophasor communication and of this Standard.

90-5 has been completed by WG10 of IEC TC57 and has been forwarded to the IEC for distribution to the member countries for balloting. The process will take several months. WG 10 expects to have the results back by the September meeting where comments will be resolved. It could be completed a short time after that.

This standard, PC37.118.2, was approved by a WG vote of 20 approve, 1 disapprove, and 1 no response out of a membership of 22. That met the 75% approval requirement so the draft was forwarded to the subcommittee for approval. They subsequently forwarded it to PSRC for the sponsor vote at the Asheville meeting in May. The WG obtained permission from PSRC to start the ballot pool formation. 61 balloters have signed up as of 19 May. The 30 day sign-up period

will complete on June 2, after which the draft can go to ballot. The IEEE-SA arranged to format the document that the WG approved and this was completed on May 10 and distributed to the WG with minor corrections.

Several members of the WG had discussed changing some parts of the approved draft to satisfy last minute concerns. It was not clear from the PSRC rules what is allowed. Matt Ceglia of the IEEE-SA researched and presented the official policy: once a draft is approved by 75% of the WG and forwarded to the sponsor, it can only be changed if it is recalled by the WG. This requires a 75% vote of total WG membership since it was passed by that requirement, or majority after issuing a notice to recall followed by a 30 day waiting period. Hence, at this point, changes desired by the WG are best done by comments in the balloting process. It was not clear that the WG wanted to do this nor were 75% of membership present at the meeting, so draft changes were not discussed. The WG decided to discuss the proposed changes with the target of having a proposal ready for submission with the balloting.

Mark Adamiak introduced change proposals based on comments he submitted with the negative WG vote. This problem is in the current standard there is no way to indicate which mode of communications is being indicated when a command to start a data output is sent. This is outside the normal scope of this standard but is needed for communication with some devices. Discussion ranged from assignment of communication to different ports, different PMU\_IDs, and simply imbedding in the stream setup. Ultimately it was decided to have a group work on this using diagrams and descriptions to come up with a proposal that is well thought through. This proposal needs to be ready by the end of June so it can be submitted with standard balloting. Mark, Vasudev Gharpure, Yi Hu, Veselin Skendzic, Galina Antonova, Rene Midence, Allen Goldstein, and Sang-Tae Kim volunteered to work on it.

There was a short discussion of the different interpretations for the use of the config change bit. It needs to be clarified—this can also be done with the revision process.

## **H20: Standard for Naming Time Sequence Data (TSD) Files**

**Chair: Eric Allen**

**Vice Chair: Amir Makki**

**Output: Standard**

**Assignment:** Elevate C37.232, *IEEE Recommended Practice for Naming Time Sequence Data Files*, to a standard.

The H20 WG met on May 17 at 9:30 AM in Asheville, NC. 5 of 6 Members were present. 5 guests were also present, for a total attendance of 10.

The H subcommittee has approved a request that the Main Committee transmit the C37.232 document (with revisions to reflect the proposed change to a standard) to the IEEE SA for balloting. There was discussion at the meeting regarding the use of Utility Identification Codes (UIC) in the company name field of the COMNAMES format. A few other comments on the draft were also discussed, including the addition of an explicit statement that the start time should be expressed using Coordinated Universal Time (UTC) and a definition of UTC. However, it was agreed that the ballot process should move forward with the current draft.

## ***Liaison Reports***

### **PES Substations Committee**

**S. Sciacca**

No report.

### **PES Communications Committee**

**S. Klein**

## **IEC TC 57 WG 10, 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, 7-1, 7-2, 7-3, 7-4, 8-1 and 9-2 are published or circulated as FDIS. From a technical viewpoint, they are done.  
Part 1 is currently in preparation to be circulated as DTR; part 3 as CDV. Part 5 is in circulation as CDV and part 10 is ready to be circulated as CDV.
2. There are different task forces working on preparing technical reports:
  - IEC 61850-90-3 – using IEC 61850 for condition monitoring
  - IEC 61850-90-4 – network engineering guidelines
  - IEC 61850-90-5 – using IEC 61850 to transmit synchrophasor data according to IEEE C37.118. This is a joint work with IEEE PSRC H19.
  - Modelling of logics
  - Functional testing
  - System management
3. IEC 61850-90-5 is currently circulated as DTR. IEC 61850-90-4 will be circulated as DC.
4. A draft UML model for IEC 61850-7-4 and -7-3 has been generated and is currently in the process to be verified. It is intended that for the future, the UML model shall serve as a basis for the standardization work.
5. Technical reports IEC 61850-7-5 and -7-500 are in preparation. These reports shall provide additional explanation on the usage of the models defined in the standard.
6. Work about logics modelling will officially be initiated by the circulation of a document for comment (DC).

IEC TC57/WG17 is currently working on the following topics:

1. A task force was created that shall prepare a technical report about the use of IEC 61850 for Distribution Automation. That task force will in a first step prepare a technical report IEC 61850-90-6, use of IEC 61850 for distribution automation.
2. The WG is revising and extending the existing models for DER as they have been defined in Edition 1 of IEC 61850-7-420. Since some of these models have a high priority for Smart Grids, it was decided to start with the publication of technical reports with the new or extended models. Technical reports may be produced faster. The named space concept of IEC 61850 has been adopted so that technical reports can be identified as intermediate models.

The following technical reports are planned:

- IEC 61850-90-7 – Photovoltaics and schedules
- IEC 61850-90-8 – Electrical vehicles
- IEC 61850-90-9 – Storage batteries
- 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. The document is circulated as DTR.
- The second Edition of IEC 61850-7-410 is ready to be circulated as FDIS.

## I: RELAYING PRACTICES SUBCOMMITTEE

**Chair: R. Beresh**

**Vice Chair: J. Pond**

The I Subcommittee met on September 14, 2011 with 24 members and 27 guests present – a quorum was achieved.

- Approved minutes of I SC meeting held in Asheville NC in May, 2011.
- Items of Interest
  - Assignments are for Reports, Working Group Scope is for standard, and Guides

- GA Tech Call for Papers deadline September 30, 2011
- Looking for presentations at May PSRC Meeting
- WG Chair & Vice Chair need to communicate if unable to attend meeting with Subcommittee Chair and Vice Chair

## 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 Wednesday, September 14, 2011 with 8 members and 3 guests.

Minutes from the May meeting in Asheville 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 is posted on the web site under "TERMS" link.

Working Group members are to review the proposed definitions from C37.236, "Digital Teleprotection" and provide feedback by October 30, 2011.

The Working Group was reminded to check the IEEE Dictionary Database when reviewing documents undergoing revision to ensure the definitions made it into the database from the original document.

The Working Group would like to express appreciation to Barb Anderson and Al Darlington for their many years of hard work and dedication to the Terminology Review Working Group and wish them well in their future endeavors.

### I4: IEC Advisory Working Group

**Chair: E.A. Udren**

**Vice Chair: M. Yalla**

**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 the PSRC on IEC standards development. WG meetings are continuing.

The WG met on September 13, 2011 with 8 attendees and discussed the only recent TC 95 document - 60255-27 – Committee Draft (CD) - *Product safety requirements for measuring relays and protection equipment*. This standard addresses mechanical, construction, insulation, and materials requirements. This new edition absorbs the contents of the existing 60255-5, *Insulation coordination for measuring relays and protection equipment - Requirements and tests*. 60255-5 will be eliminated. The result should be simplification and better organization of the total suite of testing and validation requirements, but we want to watch for changes that lead to design issues for relays. WG members and others associated with design of relaying products are invited to review this document that can impact the IEC and CE safety compliance of their designs. The Chair is recirculating this draft, along with a copy of 60255-5 and the prior edition of 60255-27, for

review by late October. Comments are due in early November. The draft does not come with a mapping of old to new requirements, so Murty Yalla has asked the Convener of the Maintenance Team working on this draft for any information on mapping of requirements.

Murty Yalla, who leads Maintenance Team (MT) 4 in development of new functional standards, reported that the MT met in Klaus, Austria on May 9-12, 2011. The three main standards that the group is working on are:

- 60255-121 – Distance relays - A Committee Draft #2 was circulated in Feb 2011 and several comments were received from the IEC National Committees. The comments were resolved and a draft of CDV is being prepared. The CDV will be circulated by Jan 2012 after the London meeting of the MT4 which is scheduled for Dec 12-15, 2011.
- 60255-149 – Thermal electrical relays - A Committee Draft was circulated in Feb 2011 and comments received from the IEC National Committees. The comments were resolved and a draft of CDV is being prepared. The CDV will be circulated by Jan 2012 after the London meeting of the MT4.
- 60255-187 – Differential relays - The document is in the preliminary stages and will be developing a CD by the end of 2012.

Murty also reported on:

- 60255-24 COMTRADE standard is handled by a Dual Logo Maintenance Team (DLMT). At this time, IEEE PSRC WG H4 is resolving the comments from the IEC National Committees on the Committee Draft that was circulated earlier this year. The plan is to submit a completed comment resolution spreadsheet along with a CDV by the end of October to IEC.
- Another item of interest from TC 95 - IEC SMB/ Strategic Group 3 is working on Smart Grid. This strategic group has produced a Smart Grid road map document and TC95 is listed as a relevant TC for smart grid. TC95 has formed an informal Chairman Advisory Group with limited participation to give input to SMB/Strategic Group 3 on Smart Grid. Murty Yalla was invited to participate in this Chairman Advisory group of IEC TC95.

#### **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 9:30 with 12 members and 10 guests attending. One guest asked to become a member and was accepted.

Chairman Kevin Donahoe opened the meeting with introductions, and reviewed our assignment. He mentioned that, although the product of this WG is a report and not a standard, we need to be aware of any patent issues.

The May, 2011 minutes were reviewed.

A protection zone drawing submitted by Don Ware was discussed. The drawing is rather fuzzy and hard to read. Is this commonly used? Is it useful for reference? It might be useful with a process bus, where the CTs are not connected directly to the relays. Andre Uribe pointed out that they use it as a planning tool to discuss substation layouts with their clients before a one-line

diagram is developed. It is not intended to be a complete one-line diagram. Andre will fix the drawing so it is readable. Rich will edit the text to make it clear that this drawing is a planning tool.

Tony Seegers discussed his material on tabular databases. The point was raised whether this belongs in the report, since it is related to a wiring diagram and not a schematic. It was decided that this falls under the category of "other types of drawings that will be discussed but are not the subject of this paper," and it will be included because it presents issues related to multi-function relays.

Most of the drawings included are fuzzy and illegible. Kevin has the electronic source files and will attempt to make legible pdf versions from them.

GOOSE messages were discussed. It was mentioned that there are other communication paths and protocols that are used, such as Modbus, DNP, FTP, MUX, etc. Do we adequately present these? Kevin will provide a sample of a block diagram in Section VII, Other Forms of Documentation.

We are pushing to have a final draft of the report to discuss by the May, 2012 meeting, so it is important that the writing assignments are submitted promptly. We ask that the assigned tasks be submitted by the end of October.

The meeting was adjourned at 2:45.

Review of assignments:

1. Andre will fix the PZ diagram to make it readable.
2. Rich will revise text of the PZ diagram.
3. Kevin will provide a block diagram and discussion showing data flow.
4. All members will review all or parts of the draft and make suggestions on how it can be improved.

**18: 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 18, Revision of C57.13.3 - Guide for Grounding of Instrument Transformer Secondary Circuits and Cases, was held in Greenway A, Hyatt Regency Minneapolis, Minneapolis MN on September 13, 2011. Six members and one guest were present.

The working group reviewed Draft 1 of the Guide and made some editorial changes. We will be updating the proposed figures to be consistent with the formatting of existing ones. Some new figures may need copyright approval (as they are instrumentation screen shots). Rich Young will review the 2005 published copy of the Guide for any typos or grammatical errors. The Guide needs to better describe the differences between 60 Hz grounding and transient grounding applications. Annex E will also be updated.

The draft will be reviewed by the working group members and updated for discussion at the January 2012 meeting as Draft 2.

Comments on Draft 1 are to be submitted no later than December 9.

**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

Working Group I8, Revision of C57.13.3 - Guide for Grounding of Instrument Transformer Secondary Circuits and Cases, was held in Greenway A, Hyatt Regency Minneapolis, Minneapolis MN on September 13, 2011. Six members and one guest were present.

The working group reviewed Draft 1 of the Guide and made some editorial changes. We will be updating the proposed figures to be consistent with the formatting of existing ones. Some new figures may need copyright approval (as they are instrumentation screen shots). Rich Young will review the 2005 published copy of the Guide for any typos or grammatical errors. The Guide needs to better describe the differences between 60 Hz grounding and transient grounding applications. Annex E will also be updated.

The draft will be reviewed by the working group members and updated for discussion at the January 2012 meeting as Draft 2.

Comments on Draft 1 are to be submitted no later than December 9.

**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 review of the IEEE Copyright and WG Guidelines slides. That was followed by a welcome and introduction of attendees, a discussion of the agenda, and then focused on WG topics of interest. There were 8 members and 7 guests.

Discussions included:

- Update and Status of the 11 Sections for the Guide:
  - Since Asheville lots of progress in the material being developed for each section
  - All but three sections have been updated and posted on WG web site
  - The others should be completed & posted by the middle of November
- Strategy for the consolidation and review process:
  - The next step is to consolidate all the Sections into a single document
  - The WG task force members will review – provide feedback – and make needed corrections
  - All members will have an opportunity to review the material

- This process will be repeated as needed
- There was discussion on a number of issues to be addressed as we move forward – they included:
  - The IEEE Style Guide template that will be used for the Guide.
  - All WG material will be funneled thru Michael Mendik, the WG web master, to the Subcommittee for posting.
  - Brian Mugalian reviewed the need to meet the requirements for the PSRC WG I2 Dictionary
  - The future need for a password for the WG web site was mentioned

**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

**Expected Completion Date:** September, 2010 (ready for ballot)

**Assignment:** To revise IEEE Std C37.90.1™-2002

The WG did not meet.

**ITF4: Reaffirmation of C57.13.1 Guide for Field Testing of Relaying Current Transformers**

**Chair: Brian Mugalian**

**Vice Chair: Bruce Magruder**

**Output: Reaffirmation and review of comments received on IEEE C57.13.1**

Task Force ITF4, reaffirmation of C57.13.1 - Guide for Field Testing of Relaying Current Transformers was held in Alexander, Renaissance Asheville Hotel, Asheville NC on May 18, 2011. This first meeting generated eight new members and five guests.

Task Force ITF4, Reaffirmation of C57.13.1 - Guide for Field Testing of Relaying Current Transformers, was held in Greenway C, Hyatt Regency Minneapolis, Minneapolis MN on September 14, 2011. Six members and five guests were present.

The group met and reviewed the existing Guide. There were good discussions on what to include in a possible revision, specifically related to NERC audits and what would be considered the minimum amount of testing a user should perform. Also, what tests should not be performed. Perhaps add an example procedure from a user.

The Chair submitted an invitation to ballot request to the IEEE on September 21.

Once the ballot body has provided comments and feedback, the Task Force will meet in January 2012 to determine if there is enough new information to request a working group.

**ITF7: Analysis of IED System Waveforms and Event Data**

**Chair: Jerry Jodice**

**Vice Chair: George Moskos**

**Output: Report**

The task force met on September 14, 2011 with 9 members and 11 guests.

The output of this group will be a report to the PSRC Main Committee.

The working group discussed and agreed on the following assignment:

Prepare a report to the IEEE PSRC. The report will define a process for identifying and analyzing and event, collecting data, analyzing techniques, and methods of reporting.

Reference papers will be provided by task force members for the next meeting to start a bibliography. The group will use these reference papers to define an analysis process.

The task force requests permission from the I Sub-committee to become a working group.

**ITF8: Reaffirmation of C37.90.3 Standard for Electrostatic Discharge Testing for Protective Relays**

**Chair: John Galanos**

**Vice Chair:**

**Output: Recommendation to the PSRC**

Meeting was held September 14 to discuss the progress of the C37.90.3 reaffirmation process. At this meeting, there were two members and three guests.

A balanced ballot group started formation in July, the ballot was initiated on September 8 2011, and the ballot will close on October 8. At this time, there are 20 affirmative, 1 abstention, and 0 negative votes. If this trend continues, the reaffirmation process will be completed by the next PSRC meeting.

**ITF9: Reaffirmation of C37.231 Recommended Practice for Microprocessor-based Firmware Revision Control**

**Chair: Roger Whittaker**

**Vice Chair:**

**Output: Reaffirmation and recommend standard**

Assignment: Form a ballot group to attempt reaffirmation of C37.231-2006, Recommended Practice for Microprocessor-Based Protection Equipment Firmware Control.

ITF9 taskforce met with seven people in attendance. After introductions, Roger W. gave a summary of the ballot results for the recently attempted reaffirmation. With 85% responding and 97+% approval, there were two negative comments out of 29 total comments. Of the affirmative vote-comments, many were editorial in nature. Several technical comments were addressed. The workgroup will respond to these comments by stating that although they agree, the comment does not change the intent of the existing standard enough to warrant a revision. Three comments were received which accompanied a disapprove (negative) ballot. The workgroup rejected/disagreed-with each of these comments and will respond to negative balloters electronically thru the IEEE balloting system. (my project/ my ballot).

Negative ballot comments proposed to modify an example firmware-change impact classification system, proposed to reference a NERC document that describes requirements for patch management of control systems, and proposed to add information about cyber security. It was decided by the group that security issues were beyond the scope of this recommended practice.

Roger Whittaker, ballot designee for C37.231, will enter the official workgroup responses into the ballot management system and then initiate the forms for possible re-affirmation.

**ITF10: Quality and Control for P & C.**

**Chair: TBD**

**Vice Chair: TBD**

**Output: TBD**

First meeting was held with 18 attendees. There was much discussion on what this topic should cover and if it was necessary. The consensus was to proceed with another meeting as there was a need for this in the industry.

**Liaison Reports**

None

**Coordination Reports**

None

**Old Business**

Jerry Jodice asked for I3 ballot results from subcommittee.

CTF3 Joint Task Force (C. Henville) discussed forum next summer at PES where Impacts of Modern Technology; Alternate Settings Groups, Syncrophasors, and Adaptive Settings will be discussed.

**New Business**

None

**J: ROTATING MACHINERY PROTECTION SUBCOMMITTEE**

**Chair: K. 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 14, 2011 with 17 members (achieving quorum) and 15 guests. There was a call for the approval of the minutes of the May 2011 meeting in Asheville, NC. Moved by P. Waudby, 2<sup>nd</sup> by M. Thompson, these minutes were approved by the subcommittee members.

**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 this session. The report is published on the PSRC website. A summary version Transactions Paper draft has received necessary PSRC approval and was submitted to IEEE Manuscript Central. Publication in IEEE Transactions on Power Delivery was declined administratively as the content was deemed better suited to the IAS or Industrial Electronics. The J officers will pursue one of these avenues. Chuck Mozina offered to get IAS contact information to the J officers. The IAS requires a presentation of the paper before it gets published in IAS transactions.

**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 is published on the PSRC website. Dale Finney has formatted the report into an IEEE-PES format for publication as a Transactions paper. Some additional editing of the figures is to be done before further proceeding with approvals and publication.

**J3: Power Plant and Transmission System Protection Coordination**

**Chair: Phil Waudby**

**Vice Chair: Sungsoo Kim**

**Established: 2010**

**Output: TBD**

**Expected Completion: TBD**

**Status: 4th Meeting**

**Assignment:** 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 C37.101, C37.102, and C37.106. The WG will also provide an on-going interface with NERC for Technical Matters Pertaining to Generator and Power Plant Protection.

The fifth Working Group meeting was held on September 13, 2011 with 22 members and 13 guests. The meeting was a double session.

The Sungsoo Kim has accepted the position of WG Vice Chair.

The WG continued to review assignments comparing the NERC Technical Reference Document – Power Plant and Transmission System Coordination to the existing IEEE Standards C37.101, C37.102, and C37.106. Relay functions 21, 32, 40, 51T/51TG, 59GN/27TN, 59, 78 and 87 were reviewed at this meeting. The WG has completed a review of all functions. The chairman will add notes of actions to forward for consideration on each protection element. By mid-October, a compilation of the comments/notes will be sent to WG volunteers to divide into recommendations for consideration by each standard and by NERC. They will complete their assignments by December 30, 2011. WG members with assignments are Hasnain Ashrafi, George Bartok, Zeeky Bukhala, Chris Ruckman, Sudhir Thakur and Tom Wiedman.

A draft of the report will be prepared for review at the January 2012 meeting.

**J5: Application of Out-of-Step Protection Schemes for Generators**

**Chair: Sudhir Thakur**

**Vice Chair: Mukesh Nagpal**

**Established: 2011**

**Output: Report**

**Expected Completion: TBD**

**Status: First Meeting**

**Assignment:** [Proposed] Produce a summary and full report to the "J" Subcommittee explaining the various schemes and setting guidelines in use for Out-of-Step protection for AC generators. The report (summary) should be in the format that could be used as feeder material into the next revision of C37.102-IEEE Guide for AC Generator Protection.

The working group met on September 13, for a single session with 15 members and 16 guests. The introductions were done. The draft assignment was discussed and the proposed assignment is as stated above. Members will be sending the relevant papers to the Chair who will be creating a List of references and distributing the same to members. The outline of the report was discussed and the Chair will be sending a draft outline to members. Three writing assignments were made.

**J6: Protection issues Related to Pumped Storage Hydro Units**

**Chair: Joe Uchiyama**

**Vice Chair: TBD**

**Established: 2009**

**Output: Transactions Paper**

**Expected Completion: TBD**

**Status: Sixth 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 in Minneapolis on September 12, 2011 with ten (10) members and five (5) guests.

1. Members introduced themselves to one another.
2. Joe Uchiyama welcomed the WG and briefly explained the purpose and goal of this WG product. He distributed meeting agenda, updated questionnaire list & May meeting minutes. Also, he explained the situation of Vice Chairman (Bob Frye) who got a promotion at TVA and is no longer able to attend PSRC meetings. The WG needs a replacement vice-chair.
3. Chairman reviewed assignments based on the May meeting minutes.
4. Contact person information: WG discussed some of the contact personnel and facilities for which we had no contact that we are going to mail the survey questionnaire.
5. WG members desire to have adequate space for end of each question so that responders can write any comments.
6. The following comments and main points were discussed during the meeting:

WG desired to use the following:

- 1) The original Questionnaire format rather than new one
- 2) There should be a question for size of unit such as < 50-MVA\_\_\_\_, 51-200-MVA\_\_\_\_, > 201-MVA\_\_\_\_
- 3) Include the starting method of Motor mode at the beginning of the questionnaire-since this will dictate the protection scheme
- 4) Question No. 2 (will be No. 4 in new Format) will be rewritten by Dale Finney
- 5) Question No.8 (use of IEEE device number) should have 27TN (Neutral Third Harmonic under-voltage), 64G (Stator ground) as well as injection type relays 64F (Field ground) and 64G (Stator ground). WG members desire to have description of each device.
- 6) Question No.9 (has user created any unique logic?) should be rewritten as "Do you utilize any programmable logic(s)?"
- 7) Question No.10 (Other) should ask that "How did you accommodate the phase rotation versus the relay settings?" [expecting the answer as (1) Same CTs & VTs with switching group setting or (2) Switching CTs & VTs]
- 8) Question No.12 (experienced problems) should divide into two parts (No.12 - Problems with old relays), and (No.13 - Problems with new relays)

As soon as the questionnaire is updated, Chairman will distribute to WG members for the final comments/approval process.

**J8: Generator Tutorial Revision**

**Chair: Michael Thompson**

**Vice Chair: Chris Ruckman**

**Established: 2007**

**Output: Tutorial (published by PSRC)**

**Expected Completion: 2011**

**Status: Completed**

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

The Working Group met for a single session with 18 members and 6 guests.

The minutes of the May 2011 meeting were approved as written.

Chair and Chuck Mozina presented at the Pulp and Paper conference in June with 12 students. Though it was a small group, it was still thought to be worthwhile.

J8 has committed to present the tutorial at PowerGen in December. Z. Bukhala, J. Johnson, and C. Ruckman have volunteered to be instructors.

Chair noted that the main goal of the instructors will be to take the 260+ slides and pare them down for an 8 hour presentation.

Chair noted that PowerGen offered to pay the instructors to help offset travel expenses. In general it was agreed that there were no issues with the instructors accepting any honorarium offered by a conference.

Chair reviewed the following tutorial presentation opportunities that are currently available:

- Washington State Hands-On Relay School – Chuck Mozina and Mike Thompson have agreed to make an 8-hour presentation of the tutorial. Chair asked for volunteers to help. None were received.
- IEEE PES T&D Conference and Relay Exposition – Chair has been corresponding with conference officials and believes that it is highly likely that the tutorial will be accepted. M. Yalla and W. Hartmann agreed to be instructors.
- Texas A&M Relay Conference – Chair has been talking with the conference planning committee and a three hour time slot before the conference starts on Monday has been proposed. It is unlikely that an all day session on Monday will be offered due to conflicts with vendor training at the same time. If only three hours are offered, it is the general consensus only a subset of the material will be presented. J. Johnson will make this proposal to the planning committee.
- PES General Meeting in July in San Diego, CA – In the past, there has not been a lot of enthusiasm for presenting this tutorial at the PES General Meeting and there was a general concern about attendance at the meeting. Chair proposed that the Working Group support the meeting and asked for volunteers. M. Yalla tentatively agreed and B. Pettigrew will be contacted to gauge his interest.
- C. Henville is working to arrange for the tutorial to be offered at the joint PES/PSRC meeting in Anaheim, CA. Tutorial would be presented on a Monday and will conflict with PSRC meetings Monday afternoon. Chair would expect that all of the original section

authors would present their section. [J Chair's note: this tutorial is a go. J Chair will ask for show of interest at the Main Committee Meeting]

Final tutorial document will ultimately be uploaded to the PSRC website.

A generic alias email address has been created for future tutorial inquiries. All inquiries will be sent to K. Stephan, M. Yalla, C. Ruckman, and M. Thompson.

Chair asked that as presenters update speaker notes before presenting the tutorial that they send him the updates so the slides can undergo a process of continuous improvement.

M. Yalla asked if a shorter version of the tutorial could be developed for presenting to local IEEE/PES chapters. Chair noted that the material is available and can be modified as necessary to suit the time given.

K. Stephan reported that the PES has a webstore that charges for various documents created by the PES. It is the general practice of the PSRC to offer documents created by the PSRC free of charge on the PSRC website. K. Stephan will work to get the old document removed from the webstore and try to get the new one added and available for no charge.

No further meetings are necessary and Chair will formally request to disband the working group. [J SC Chair's note: the J8 Working Group was disbanded]

**J9: Motor Bus Transfer**

**Chair: Jon Gardell**

**Vice Chair: Dale Fredrickson**

**Established: 2006**

**Output: Working group report**

**Expected Completion: 2011**

**Status: Draft 5.0**

**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.

The Working Group did not meet in Minneapolis.

Status: Draft 5 of the report to the J Subcommittee is complete in terms of technical content, and is being edited for format and organization by Steve Conrad. Upon completion, the report will be sent electronically to Working Group members for final approval. There will not be a formal ballot. The Working Group will not meet in January 2012.

**J10: PC 37.96 Guide for AC Motor Protection**

**Chair: Prem Kumar**

**Vice Chair: Dale Finney**

**Established: 2007**

**Output: Guide Revision C37.96**

**Expected Completion: 2012**

**Status: Draft 6.0**

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

The meeting was attended with 15 members and 8 guests. After the introductions, the Patent Slides were shown. This was a double session.

The Asheville meeting minutes was approved with a quorum. An extension to the PAR has been applied for.

The various section wise assignments (as tabulated in the Asheville meeting minutes) that were completed were reviewed by the WG. There was a consensus from the WG on path forward for the various comments that were reviewed. The remaining assignments that were to be reviewed (items 1,2 and 3 below) by WG but editorial comments will be incorporated in the next draft. Items 4,5 and 6 will have to be completed by next meeting

- 1) Motor Protection Requirements section 5.1 to 5.5 by Sudhir Thakur. He will add small introduction to section 5.0 during review.
- 2) Device 11, section 8 will be reviewed by Nick Hoch
- 3) Annex A2 on thermal modeling will be reviewed by Nick Hoch.
- 4) Prem/Dale Finney will cleanup WG membership to trim membership to only members who have actually participated
- 5) Annex A3 Example will be reviewed by Dale Finney.
- 6) Mike Reichard will review for any impact to C37.96 based on Aurora phenomenon.
- 7) Prem would follow up with Murthy Yalla for a copy of IEC report on "thermal modeling" to review for any impact to C37.96

The chair will send out draft 7.0 with all assignment comments incorporated as agreed by WG and for items 1 through 4. All remaining assignments due by November 15<sup>th</sup>.

#### **JTF7: Considerations for "AURORA" Protection**

**Chair: Mike Reichard**

**Established: 2010**

**Output: Report to Subcommittee**

**Expected Completion: 2011**

**Status: Task Force Completed**

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

The task force met on Tuesday, September 13, 2011 with 15 members and 23 guests.

The chair gave a very brief review of the purpose of the Aurora alert issued by the ES-ISAC through NERC.

Daryl Hammond, USAF Chief Electrical Engineer, discussed testing his office had done at 12.47kV. Summary was that on directly connected generators to a medium voltage system, voltage decayed so fast that AURORA was not an issue. The voltage decays so quickly that by the time you reclose, the machine is off line. Tests where equal import/export generation experienced some problems. Significant problems occurred where generator short circuit ratio (SCR) with system is much smaller. He will send the report to the JTF7 Chair. The USAF current practice is; no SCADA, physical security, and cyber security. Daryl signed up to be a member of JTF7.

Pratap Mysore reported on Jeff Roberts' new paper suggesting AURORA vulnerability occurs when SCR reaches 5:1 and higher. The paper is circulating in the NERC CIP group and not available publicly. [Editor's note: the paper is actually a 2007 paper]

Cristian Poduraru, ITC, said his company is conducting AURORA vulnerability assessments without guidance from NERC.

Mike Thompson pointed out that SCRs affect generator mechanical withstand capabilities (bracings on windings). Chuck Mozina followed that SCR affects the delta P calculation which should be less than 0.5pu on machine base.

Chair attended a May 25 Webinar held by NERC on AURORA. GenCos were required to report their status with respect to AURORA vulnerability to NERC by June 13, 2011. A significant take away from the meeting was that reclose in < 0.1 seconds mitigates.

Chair/Chuck Mozina discussed Georgia Tech Paper on HMD testing conducted by Dominion. Results were not conclusive that the HMDs mitigated AURORA vulnerability.

Discussion was held attempting to develop topics and subtopics for such a paper/report.

Four "areas of vulnerability" and nine mitigation concepts were identified:

- A) Breakers near machines
  - B) Breakers electrically far from machines
  - C) Protection against wide-angle closing
  - D) Protection against repetitive closing
- 
- 1) HMDs pros and cons
  - 2) Blocking Timers
  - 3) High-speed sync check
  - 4) Synchrophasors
  - 5) System stiffness—is the system strong enough to cause damage?
  - 6) Can out-of-step closing current be calculated and detected?
  - 7) Do the equipment owner's schemes respond to block wide angles?
  - 8) Do the machines lockout on load rejection (tripping)?
  - 9) DG/generator control systems

Recommendation of JTF7 is to initiate a working group.

[J SC Chair's Note: JTF7 was elevated to WG J7 during the subcommittee meeting.]

#### **Other Reports:**

C17: Fault current contribution from wind farm plants

No report was given.

#### **Liaison Reports**

##### **Electric Machinery Committee (EMC)**

**C. J. Mozina**

The Committee met at PES General Meeting in Detroit--- July 24-29, 2011. The minutes for this meeting are not as yet posted on the EMC web site. The minutes of the 2010 meeting were recently posted on the EMC web site. Items of interest to the PSRC from these minutes are:

- A new subcommittee is being formed on "Renewable Energy Machines and Systems"
- WG9: Wind Energy Machines and Systems: 3 paper panel sessions are planned for 2011, and a tutorial in 2012. It is expected that this working group will transfer to the new Subcommittee on renewable energy cited above.
- WG10: Generator On-Line Monitoring: A draft report will be prepared by July 2011.
- WG4: Grid Induced Torsional Vibration: A paper panel is proposed for 2011.

##### **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**

Nothing new to report.

**P. Kumar**

**NERC (related to rotating machinery)**

**J. Uchiyama**

SPCS (NERC System Protection and Control Subcommittee) is providing support for many NERC Activities

PRC-023—Now getting into loadability of generators connected to the Bulk Electric System (BES), 100 kV and above. Loadability is measured at .85 pu voltage and 30 degrees power factor with 8 to 9 “methods” such as 150% overload. Out-of-Step settings must not reach loadability limits.

PRC-005 Testing & Maintenance is now in the comment period. There is a NERC white paper on this topic, the paper is old and has good technical information but the testing intervals and requirements have changed in the PRC standard.

The Out-of-Step Technical Reference Paper is getting started.

**Coordination Reports**

None

The reaffirmation ballot period for C37.101 Guide for Generator Ground Protection has closed. The standard received 98% approval but has two negative ballots. The negative ballot comments are being reviewed.

The reaffirmation ballot for C37.102 Guide for AC Generator protection has been started..

**New Business**

Murty Yalla becomes Chair of J beginning in January 2012. Mike Reichard has been appointed to be Vice-Chair also starting in January.

**K: SUBSTATION PROTECTION SUBCOMMITTEE**

**Chair: P.G. Mysore**

**Vice Chair: M. J. Thompson**

The K-Subcommittee met on Thursday, September 15, 2011 in Minneapolis, MN, with 21 members and 15 guests in attendance. A quorum was achieved to approve the minutes of the May 2011 subcommittee meeting.

One new member joined the K subcommittee: Chuck Mozina. The committee membership presently stands at 31 members.

The following Task Forces were elevated to Working Groups starting at the January 2012 Meeting: KTF5 has become WG K5.

**Reports from the WG Chairs****K1: GUIDE FOR THE APPLICATION OF PROTECTIVE RELAYING FOR PHASE SHIFTING TRANSFORMERS.**

**Chair: Arvind Chaudhary**

**Vice Chair: Lubomir Sevov**

**Established: Sept. 2011**

**Output: Guide for the Application of Protective Relaying for Phase Shifting Transformers**

**Expected Completion Date: Sept. 2015**

**Assignment: To write a guide for the application of Protective Relaying for Phase Shifting Transformers (PSTs). The protection methods for different types of PST and operating conditions of PSTs will be reviewed. Representation of PST models to determine short circuit currents for relaying considerations will be considered. Protection CT sizing and location issues will be considered. Relay application and setting examples will be provided.**

The K1 working group met with 9 attendees total. Attendees included 6 WG members and 3 guests present.

- The K1 WG meeting started with introduction of the attendees and review of the meeting notes from KTF1 meeting in Asheville, NC in May, 2011.
- Eli Pajuelo raised the question on the stray flux influence on the neutral side CTs buried inside the PST tank, and the impact on the primary 87P differential protection. It was agreed that the guide will provide information on CT locations with respect to the PST type, and the impact on the protection.
- Dean Miller explained the control of the PST during overloading conditions and the power flow control through tap switching.
- Eli brought up the question on whether or not a Point-on-Wave (POW) closing during PST energization shall be covered in the guide. It was agreed to mention the impact on protection during controlled POW switching.
- Eli mentioned that IEEE C57.135 doesn't explicitly mention the test methods for short circuit tests for the zero sequence impedance. Mike Thompson proposed that we can provide guidance to end users on what impedance data and tests to request when purchasing a PST.
- Arvind proposed to follow the PST types as described in the IEEE C57.135 guide, and it was determined to focus on the following PST types: Single core PST with half tap winding, Single core PST with full tap winding, Single core Delta Hexagonal PST, and Two-core PST. Eli to check if any other types of PSTs exist.
- Arvind to request volunteers who would model and perform short circuit study for the PST types. Joe Mooney to investigate if Aspen software or the RTDS system can model PSTs. Arvind to check if PSTs can be modeled with ETAP or PSCAD or CAPE.
- Joe mentioned that PAR needs to be filed, and the table of content need be developed before the next meeting.
- It was discussed as to whether or not papers related to PST protection need be presented in the next meeting. It was decided to collect the papers and put them all together on the website.
- It was decided to make the preliminary outline of the guide. Arvind and Lubo to take action and come up with preliminary outline before the next meeting.
- Request Bogdan to provide access to CIGRE papers on PSTs.

**K3: REDUCING OUTAGES IN TRANSMISSION SUBSTATIONS**

**(subtitle: Reducing Outages Through Improved Protection, Monitoring, Diagnostics, And Auto restoration In Transmission Substations)**

**Chair: Bruce Pickett**

**Vice Chair: Paul Elkin**

**Established: 2010.**

**Output: Papers - 1. Full Paper Report to the Sub Committee and Main Committee, and 2. Summary Transactions Paper**

**Draft 2; Transactions Summary paper 0**

**Expected Completion date: 2013**

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

Meeting was called to order September 12, 2011 with 5 members and 1 guest

Introductions were done and previous minutes were discussed.

We reviewed draft-2 of the paper.

Reiterated that any specific topics that were fully covered in the D2-WG for the C37-104 Reclosing Guide would not be covered in any detail in this paper.

We identified several areas of additional details and examples that could be included with volunteers to review/write these new ideas.

We added one new member.

**K4: (PC 37.95.2002): GUIDE FOR PROTECTION CONSUMER UTILITY INTERFACE**

**Chairman: Mukesh Nagpal**

**Vice Chair: Chuck Mozina**

**Established: 2008**

**Output: Guide Revision**

**Draft 6**

**Expected Completion Date: 2012**

**Assignment: To revise C37.95-2002 (R2007) – Guide for Protective relaying of Utility-Consumer Interconnections**

The working group met in double session on Tuesday, September 13, with 8 members and 14 guests present. A quorum was not present.

After introductions the IEEE Patent Slides were shown.

The chairman presented the minutes from the May, 2011 meeting and updated the WG on status of the revisions to C37.95 – Draft 6.

**Review of progress on passed assignment.**

Section 1.3 Definitions – Assigned to Adi Mulawarman, Roger Whittaker, Jerry Johnson.

Co-generation, Standby generation and IPP were dropped from the definition section because these terms will not be used in the document.

Section 5.2.1 Capacitor Tripping – Chuck Mozina will add a sentence that DC tripping is preferred and why to complete this assignment.

Section 7.3 Consumer with Generation in Parallel with the Utility but No Planned Power Export - Dean Miller will add a drawing to clarify tripping practices to separate the consumer generation from the utility system.

Figures 1-9 – Steve Conard and Jeff Barsch will re-draw Fig. 1-9 to reflect changes made in these drawing to remove secondary fuse and replace with breakers which reflect general industry practice. Also a sentence will be added to the text under drawing 1 to caution on fusing transformers where the secondary ground current is limited by a grounding resistor.

The bulk of the WG meeting was devoted to reviewing Section 7 as well as how this Section impacts Section 8 of the document. Section 7 discusses interconnection practices with consumers with generation. Major changes were made this section which included:

- Clarifications of the description of the three types of consumer generation applications.
- Clarification of the use of directional power relays and the use of the 37 device function number to describe the underpower relay function.
- Transfer of the section on over/under voltage and frequency windowing from the Section 7.4 to 7.3
- Section 7.3.1 Consumer with Generation in Parallel with the Utility but No Planned Power Export – The description of the interaction of the consumer generator governor control with the reverse power relay and utility system automatic reclosing was clarified through the re-wording of the paragraph that discussed this issue.
- The term MOD will be used rather than MOAB throughout the document.
- Breaker failure will be added to drawings in Section 8 for locations where the consumer installation provides a source of fault current to the utility system.
- Transfer Trip will be shown as a protective function on all drawing in Section 8 where the customer installation provides a source of fault current to the utility system.

**Assignments:**

Section 7&8 – Chuck Mozina will review Sections 7&8 for continuity and will update the drawings in Section 8 to reflect the changes made in Section 7.

All writing assignment are due to the chairman by Dec. 20.

**Membership:**

The chair will write individual emails to the non-participating and non-attending members advising them removal of their names as working group members.

**K6: SUDDEN PRESSURE PROTECTION FOR TRANSFORMERS**

**Chair: Randy Crellin**

**Vice Chair: Don Lukach**

**Established: May 2005**

**Output: Report**

**Expected Completion Date: January 2011**

**Draft 6.0**

**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 afternoon, September 13th, in a single session with 7 members and 12 guests. Two of the guests indicated that they would like to become members of the working group so that they could spend their evenings and weekends working on new writing assignments. The working group currently has 12 members.

After introductions and a brief review of the working group progress, we discussed the recent revisions that Gene Henneberg made to the survey summary document. We are currently on Draft 6 of this summary document.

In an effort to complete the technical report, the working group decided to incorporate major findings from the survey results. New writing assignments include the following:

Elmo Price – write a section on negative sequence differential relaying

Greg Sessler – summarize the survey results to be included in the report

Pat Carroll – write an introduction for the technical report

Randy Crellin – reformat the document and redraw figures for uniformity

Guests and other members – review the information and provide comments

These assignments are due by the end of October and will be discussed during a November conference call. Our intentions are to finalize the survey summary document and the technical report during our next working group meeting in California..

**K8: GUIDE FOR THE PROTECTION OF SHUNT CAPACITORS**

**Chair: Pratap Mysore**

**Vice Chair: Iliia Voloh**

**Established: 2006**

**Output: Revision of IEEE C37.99-2000**

**Expected Completion date: 2011**

**Status: Draft ??**

**Assignment: Revise and update C37.99-2000 “Guide for the Protection of Shunt Capacitor Banks.”**

The working group met on Tuesday afternoon, September 13th, in a single session with 13 members and 5 guests.

After introductions, the chair informed the working group on the status of the guide in the balloting process. Balloting pool was formed in August with 141 signing up. The draft 5.0 is under mandatory editorial review and is expected to come back around September 27.

The PAR extension was approved for one year. The chair hopes to complete the balloting process before January meeting.

**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.**

Working group K10 met on Tuesday, September 12, 2011 in Minneapolis MN, with 3 members and 7 guests in attendance. IEEE/1547.x working group activities were reviewed.

P1547.4 "Draft Guide for Design, Operation and Integration of Distributed Resource Island Systems with Electric Power Systems", is complete and available for purchase.

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" is complete and awaiting next SA committee meeting for release.

IEEE P1547.7 "Draft Guide to Conducting Distribution Impact Studies for Distributed Resource Interconnection", met the week of Aug 1, 2011 and draft 5.1 has been posted to the web site. Plan is to ballot latter this year or first quarter next year.

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 in the week of Aug 1, 2011 and draft 1.1 has been posted to the web site. Appendix C includes Protective Relaying Best Practices.

Open discussion covering wind, solar, and battery storage facilities. There was an excellent of exchange from guests and members. If anyone needs passwords for the working groups send me an email.

**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.

**KTF5: Review Affirmation Comments for IEEE C37.119TM-2005– IEEE Guide for Breaker Failure Protection of Power Circuit Breakers**

**Chair: Roger Whittaker**

**Vice Chair: Adi Mulawarman**

**Established: May 2011**

**Output: Formation of a working group K5**

**Draft: None**

**Expected Completion Date: To Be Determined.**

**Assignment: To revise and update C37.119-2005 – IEEE Guide for Breaker Failure Protection of Power Circuit Breakers.**

The working group met on Wednesday, September 14th 2011, 29 attendees with 21 interested in becoming a member and 8 guests present.

Roger Hedding presented Summary of Breaker Failure guide based on 2005 revision.

The chair will request a formation of Working Group at the subcommittee meeting if the stated assignment is accepted by the subcommittee.

The chair will plan to submit PAR no earlier than October 17<sup>th</sup> 2011 as recommended by the subcommittee chairmain to gain extra time to work on the guide .

General discussion of scope and purpose is completed.

No assignments given to member of KTF5.

At the next PSRC meeting the group request 1 session, room for 30 people, and overhead projector.

Summary of scope/purpose.

**Proposed Scope:** This guide describes methods to protect a power system from faults that are not cleared because of failure of a power circuit breaker to operate or interrupt when called upon. The discussion is limited to those instances where the breaker does not clear the fault after a protective relay has issued a command to open (trip) the circuit. Failure to close and **failure while closed**, are not discussed. The intent of this guide is not to give the reader methods of protecting a power circuit breaker from failing; rather, it is to give the reader a guide in how to detect that a breaker has failed to clear a fault, and how to electrically isolate the fault after the breaker has failed to clear the fault.

Also covered are recent practices which take advantage of new technologies.

**Proposed Purpose:** This guide is intended to help the relay engineer understand the application considerations when applying breaker failure protection (BFP) to power circuit breakers.

**Liaison Reports:**

IAS Arc Flash - Chuck Mozina reported IEEE 1584 –Guide for performing arc flash hazard calculations is revised. He will pass on the details as soon as they are available.

Capacitor Subcommittee-

- Clause 8.3 on testing of MOV in the IEEE guide C37.116 on series capacitor protection was reviewed by Capacitor subcommittee and Surge protector subcommittee chairs. Both of them

felt that this needed to be revised but, has not provided the corrections for corrigendum. Per Lindberg of ABB has been contacted to provide the write up.

- IEEE 18 is under revision
- A paper on “Inductor applications for capacitor switching technologies” is worked on as a joint switchgear committee and capacitor subcommittee output.

**Old Business:**

There was no old business discussed.

**New Business:**

KTF5 was elevated to WG K5 in the subcommittee meeting.

IEEE PES Static VAR committee (I4): There is a new WG I9 - IEEE Recommended Practice of a Modern Protection System for Static Var Compensators Chaired by M. Halonen. The document will cover protection aspects integrated with controls in SVC. Pratap will work with Bob Pettigrew and write a response to the committee chair to coordinate protection issues with PSRC.

**VII. PRESENTATIONS:**

Our presentations at this meeting:

- **Redundancy in Coupling of Power Line Carrier – Roger Ray**
- **Changes to Reaffirmation/Stabilization process – Erin Spiewak**
- **Generator Tutorial Revision Summary – Michael Thompson**

**VIII.** The meeting was adjourned by Chairperson Bob Pettigrew