



**POWER SYSTEM RELAYING COMMITTEE  
OF THE IEEE POWER and ENERGY SOCIETY  
MINUTES OF THE MEETING  
May 16–19, 2011  
Asheville, NC  
FINAL**

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

Chairman Bob Pettigrew called the meeting to order at 1:30 pm  
After introductions, a quorum was verified.

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

The minutes of the Atlanta January 2011 meeting were approved as posted. We had no financial obligations at that meeting.

**Chairman's Report Bob Pettigrew**

Due to the Atlanta ice storm many missed the announcements. I will repeat several important items from Atlanta.

- I am pleased to announce that 11 new main committee members have been appointed. These appointments are based on the individual's contribution to the PSRC and membership in a subcommittee. The new Main Committee members are:

Eric Allen, Galina Antonova, Roy Ball, Rick Cornelison, Dominick Fontana, Meyer Kao, Sungsoo Kim, Aaron Martin, Sam Sambasivan, Sudhir Thakur, & Ilia Voloh  
Congratulations to these new Main Committee members.

- I also want to recognize two of our members who were recently awarded the status of IEEE Fellow. Congratulations to Chuck Mozina and Rick Taylor.

Several years ago we changed the meeting format to the current East Coast & West Coast formats. This was done to provide additional meeting space for the growing number of working groups within the PSRC. Based on several years of experience with the East coast/West coast format we are now announcing a new format for future meetings. Meetings will start on Monday afternoon at 3:00PM and be completed by Thursday at noon. The following figure displays the new format.

|                 | <b>New Format</b>   |                |  |                              |
|-----------------|---------------------|----------------|--|------------------------------|
|                 | <b>Monday</b>       | <b>Tuesday</b> | <b>Wednesday</b>                         | <b>Thursday</b>              |
| <b>8:00AM</b>   |                     | WG Meetings    | WG Meetings                              | Main<br>Committee<br>Meeting |
| <b>9:15 AM</b>  |                     |                |  |                              |
| <b>9:30 AM</b>  |                     | WG Meetings    | WG Meetings                              |                              |
| <b>10:45 AM</b> |                     |                |  |                              |
| <b>11:00 AM</b> |                     | WG Meetings    | WG Meetings                              |                              |
| <b>12:15 PM</b> |                     |                |  |                              |
| <b>LUNCH</b>    |                     |                |  |                              |
| <b>1:30 PM</b>  |                     | WG Meetings    | SC Meetings                              |                              |
| <b>2:45 PM</b>  |                     |                |  |                              |
| <b>3:00 PM</b>  | General<br>Meetings | WG Meetings    | SC Meetings                              |                              |
| <b>4:15 PM</b>  |                     |                |  |                              |
| <b>4:30 PM</b>  | WG Meetings         | WG Meetings    | SC Meetings                              |                              |
| <b>5:45 PM</b>  |                     |                |  |                              |
| <b>6:00 PM</b>  | Reception           |                | 90 WG Meeting Slots<br>(9 Meeting Rooms) |                              |

We are pleased to announce that Jeff Gilbert has been awarded the IEEE-SA Standards Medallion. The Standards Medallion is awarded to recognize outstanding leadership and contributions to the IEEE-SA and the development of standards. This medallion recognizes Jeff's many years of work as the PSRC Standards Coordinator.

### III Reports of Interest

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

**PES General Meeting** July 24-28, 2011 Detroit, MI

A total of 35 papers were approved for the 2011 PES General Meeting. A total of five sessions are scheduled for the 2011 GM.

4 PSRC Paper Sessions - 32 papers

- 1 PSRC Paper Forum Sessions - 3 papers

We will need 5 people to chair the various sessions. Please see me for further information.

**Power Systems Conference and Exposition (PSCE)** March 20-23, 2011 Phoenix, AZ  
Theme: "Next Generation Grid - Putting it All Together"

PSCE was held in Phoenix March 20-23, 2011. We held 1 poster session for this meeting.

**T&D Conference and Exposition** May 7 – 10, 2012  
Orlando, FL  
Theme "Making Innovation Work for Today and Tomorrow"

The technical program is designed to highlight new innovations and challenges facing the power and energy industry. The conference will also include special emphasis on the role of *Women in Engineering*.

A Call for Papers has been broadcast. Paper submission site opens August 15<sup>th</sup>. Papers must be submitted by September 19<sup>th</sup>.

I will be needing reviewers for the papers as they come in.

## **Future Meetings**

|                       |   |
|-----------------------|---|
| September 12-15, 2011 | Hyatt Regency, Minneapolis, Minnesota               |
| January 9-12, 2012    | (JTCM) Hyatt Regency Orange County, Garden City, CA |
| May 13-17, 2012       | Astor Crowne Plaza Hotel, New Orleans (NEW)         |
| September 10-13, 2012 | Hilton Portland; Portland, OR                       |
| January 2013 (TBD)    | JTCM  |

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

No report submitted

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

The following are items of interest to the PSRC:

- **Color Book Reorganization Progress** – The IAS Industrial & Commercial Power System Dept. — I&CPS (responsible of the IAS color books) held its meeting at the IAS General Meeting – May 1-5 in Newport Beach, CA. This group is updating and converting the color book series into individual IEEE standards. The major item of interest for the PSRC is the Buff Book (Protection and Coordination of Industrial and Commercial Power Systems). Some progress is being made with two of the 13 standards being submitted for PES balloting. The chairman of the IAS standard on interconnecting industrial customers to utility systems plans to attend the next PSRC K-4 C37.95 WG meeting in Minneapolis. Both standards address the same subject from different perspectives.
- **Arc Flash** – The IAS is the home of IEEE standard 1584-2004, a key Arc Flash standard that is currently under revision. The WG that is updating this standard will meet at the Petroleum and Chemical Industry Committee Conference (PCIC) that will be held in Toronto in Sept. Significant changes are being made to this standard.
- **Generator Protection Tutorial** – The PSRC developed IEEE Tutorial on the Protection of Synchronous Generator developed by the PSRC J-8 WG was presented at Petroleum and Chemical Industry Committee Conference (PCIC) in  
• San Antonio, TX on Sept. 23. This was the first presentation of the tutorial. Approximately 70 people attended the tutorial. The tutorial was also presented at this year's IAS Pulp and Paper Conference (PPIC) on June 23, 2011 in Nashville, TN. Mike Thompson and Chuck Mozina presented both tutorials.

### **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 Working Groups. The Convenor of MT4 is Murty Yalla – 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). They successfully completed Standards 60255-151 (Overcurrent relays) and 60255-127 (over and undervoltage relays).

The Technical Advisor to USNC for TC 95, Eric Udren, requested that USNC appoint Dr. Murty Yalla as Deputy Technical Advisor for TC 95. The USNC has approved, and Murty will help with our USNC business going forward. He already has been giving an award-winning performance as leader of MT4 developing a series of functional standards on which we've reported over several years.

We reported last time on how the USNC proposed IEC adoption of the IEEE C37.118 Synchrophasor Standard, and why the IEC elected a joint IEC-IEEE dual logo development since the IEEE work was not completed at that time. The resulting IEC-IEEE Standards WG, with Ken Martin as Convenor, met here in Asheville on Monday to kick off work on the document that will be call IEC 60255-118-1, Synchrophasor Standard for Power Systems. A draft will be put forth after IEEE C37.118.1 has completed Standards balloting, expected later in 2011.

Draft IEC TC 95 functional standards out from IEC Central Office in Geneva for USNC Comment:

- 60255-121 – *Functional Standard for Distance Relays*. WG D21 is handling comments, but has none for the current highly revised version of the document.
- 60255-149 – *Functional Requirements for Thermal Electrical Relays* – This is a new document describing methods for protection of motors, transformers, and generators. It includes a comprehensive tutorial discussion of the modeling approach. The US will submit comments on questions about the use of variable names, and the lack of treatment of motor service factor, a standard nameplate value in North America, in the modeling discussion.

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

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

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

##### **Standards Activities since the January, 2011 meeting.**

The status of standards activities that have taken place since the January, 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**

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

C37.92 Standard for Low Energy Analog Signal Inputs to Protective Relays from Electronic Voltage and Current Transducers

- **Standards submitted for reaffirmation**

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

C37.92 Standard for Low Energy Analog Signal Inputs to Protective Relays from Electronic Voltage and Current Transducers

- **Standards approved**

None

- **Standards submitted for approval**

None

- **Standards to be submitted for approval**

None

- **Submitted for Balloting/ Recirculation**

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

PC37.238 Standard Profile for Use of IEEE Std. 1588 Precision Time Protocol in Power System Applications

- **Standards Balloted**

None

- **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

C37.113 Guide for Protective Relay Applications to Transmission Lines 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**

PC37.232 Standard for Common Format for Naming Time Sequence Data Files (COMNAME)

PC37.244 Guide for Phasor Data Concentrator Requirements for Power System Protection, Control, and Monitoring

- **New PARs approved**

PC37.232 Standard for Common Format for Naming Time Sequence Data Files (COMNAME)

PC37.244 Guide for Phasor Data Concentrator Requirements for Power System Protection, Control, and Monitoring

- **PAR Extensions applied for**

None

- **PAR Extensions approved**

None

- **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

**SUBMITTAL DEADLINES & STANDARDS BOARD MEETING SCHEDULE**  
**PAR/Standard Submittal Deadline Standards Board Meeting**

|  |                   |
|--|-------------------|
| July 29, 2011  | September 8, 2011 |
| October 17, 2011   | December Systems  |
| PC37.237 Recommended Practice for Time Tagging of Power System Protection Events 6, 2011 |                   |

**F. Substations - Pruess**

No Report

**G. NERC Report – Phil Tatro**

Phil Tatro reported on protection-related NERC activities. The NERC Standards Committee has prioritized all standards development projects and identified 12 projects as high-priority. Four of these projects include protection-related standards addressing the following subjects: protection system coordination (PRC-001), maintenance and testing (PRC-005), misoperations (PRC-003 and PRC-004), and generator performance (PRC-019 and PRC-024). These projects are in various stages of development. The recent ballot of PRC-005 achieved 66.56 percent approval. The standard may move a successive ballot or a recirculation ballot pending drafting team review of the ballot comments. The nomination period is expected to open soon for the misoperations standard project. The generator relay loadability project is not one of the 12 high-priority projects and will enter an informal development period until other high-priority projects are completed. Standards on underfrequency load shedding (PRC-006-1) and transmission relay loadability (PRC-023-2) have been filed with FERC since the last PSRC meeting.

The System Protection and Control Subcommittee (SPCS) has completed its review of comments submitted on the Transmission System Phase Backup Protection reliability guideline, and thanks PSRC members for their comments. Responses to comments and a revised document have been submitted for approval at the June 7-8 Planning Committee meeting. The document includes a recommendation for phase backup protection of large autotransformers to address reliability impacts associated with prolonged through-faults. The SPCS continues work on a technical document addressing operation of protection relays in response to power swings. The document will support development of a standard addressing this subject, as directed in FERC Order No. 733. The work is a joint effort with the NERC Transmission Issues Subcommittee (TIS).

**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 May 17th, 2011 in Asheville, NC, with 5 of its 7 members.

There are over 30 awards to hand out in Asheville. The 2009 and 2010 Distinguished Service Awards. A certificate of appreciation to Jeff Gilbert as PSRC Standard Coordinator for the past six years. Several certificates of appreciation for completed working groups.

PSRC nominated Jeff Gilbert for the IEEE Standards Medallion. We are very pleased to report that on 11 May 2011 the IEEE-SA Awards Committee unanimously voted to award Jeff a Standards Medallion. It will be presented at an IEEE Awards ceremony to be held at the Hyatt Regency Hotel in New Brunswick, NJ on Sunday, 4 December. More details will follow as we get closer to that date.

There is few service awards left from September. It was decided to present service awards twice before mailing them to recipients.

It was announced upcoming voting for 2011 Distinguished Service Award and 2011 Prize papers. List of candidates will be distributed before next meeting.

Regarding papers, guides and standards, we have eligible work completed between September 2008 and May 2011. Each vice chair will distribute the candidate papers of each subcommittee for review by the group. The meeting in September will be used for discussion.

The list of activities of WG B1 is completed and reviewed in previous meetings. This document will be circulated to the group before next meeting.

2010 PSRC Prize papers and PES nominations were sent to PES. We expect announcements before the PES general meeting.

**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 220.

16 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**

Groups did not meet.

**B5: Bibliography and Publicity**

**Chair: T.S. Sidhu**

**Vice Chair: M. Nagpal**

The working group B5 (Bibliography and Publicity) meeting was held at 1:30 PM on May 17, 2011 in Room Eagle at the Asheville PSRC meeting. The meeting was chaired by Dr. Y. Liao in absence of the Chairman. Five members were in attendance. Members were informed that bibliography papers will no longer be published in the IEEE Transactions on Power Delivery. Members had an initial discussion on possible future direction of this working group. The Chairman is having further discussions with the members and the results will be presented to the PSRC officers for their input at the Sept. 2011 meeting.

**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, May 19, 2011, in Asheville, NC with 26 members and 38 guests in attendance. Quorum was reached.

7 Working Groups met at this meeting.

The members of the Subcommittee approved the minutes of the September 2010.

PSCE liaison report: Nothing to report.

PSSC liaison report: See CTF3 meeting minutes below.

**OLD BUSINESS**

None

**NEW BUSINESS**

The A new Task Force was formed with the title "Transmission to Generation Interconnection Protection Considerations".

The TF will coordinate with K4 C37.95 "Relaying of utility-consumer interconnections" and J3 "Power Plant and Transmission System Protection Coordination" to ensure that what the task force intends to is not already included in the scope of these two other groups.

Alla Deronja will lead the task force which will be CTF18

**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 in the Salon A meeting room in the Renaissance Hotel in Asheville, NC USA on May 17, 2011 at 3:00 pm. Individual introductions were made and attendance was taken. 21 members and 43 guests were in attendance.

The meeting began with a review of the present draft report. The general consensus was that a majority of the draft provides many descriptions of Smart Grid functionality rather than detailing the role protection devices and data have or may have in the Smart Grid. It was decided that the present draft needs to be cleaned and modified so as to comply with the assigned role of the working group. It was requested that contributors of existing material review and modify their contributions with that directive in mind.

A Utility Users contributing group and assignment was defined, and a list of volunteers was collected. The assignment for this group is to list the protection functions, features, and data they as users want to see and have made available for use in Smart Grid applications.

Similarly, a Protection Vendors contributing group and assignment was defined, and a list of volunteers was collected. The assignment for this group is to list the protection functions, features, and data that are available in their equipment for use in likely and possible Smart Grid applications.

Both groups are to submit their contributions as informative lists rather than lengthy texts. Once submitted, a group of reviewers will analyze the submissions and add relevancy and applicability comments. A list of volunteers was collected for this review group.

It was agreed that there would be value in adding an introductory chapter to the report that addresses some issues and provides applicable information, including a list of applicable Smart Grid related standards, the role of engineering in this effort, and various likely challenges.

It was stressed that the working group and the contributors need to remain aware of the activities of Working Group H2 so as to not duplicate their efforts.

Writing assignments and contributions need to be submitted by the group to the chair and vice chair by July 1, 2011. Earlier contributions are encouraged. A list of assignments and respective volunteers are attached to these minutes.

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.

#### **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 May 18, 2011 in a double session. The first session had 7 members and 30 guests and the second session had 7 members and 9 guests.

The IEEE-SA Patent Slides were shown.

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

Following the January 2011 meeting, Matt Ceglia, IEEE-SA, had the four separate sections of the draft guide combined into one document in IEEE format.

In the first session there was a review of the work of two Task Groups that were assigned (in the January meeting) to further update the Installation, Commissioning and Maintenance section, and the System Testing and Calibration section.

In the two sessions, volunteers were identified to perform a comprehensive review of the current document with a view to removing redundancy between sections and to improve the overall flow of the document. The volunteers will forward their comments and suggested changes to the Chair within four weeks. The following week, the Working Group will meet by conference call/webinar to review and consolidate the proposed revisions to the document. By the end of this week, the Chair will send the current draft of the draft guide to members and guests for review and comment.

Once the Working Group has completed the work on the revisions, the draft guide will be sent to IEEE SA for further editing. The resulting document will be circulated to members prior to the September meeting.

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

**C13: Undervoltage Load Shedding Protection**

**Chair: Miroslav Begovic**

**Vice Chair: Shinichi Imai**

**Output: IEEE Report**

**Established: September 2005**

**Expected Completion Date: May 2011**

The WG did not meet. C13 will meet in September to resolve comments on the working group report.

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

**Chair: Jim O'Brien (Jim.O'Brien@duke-energy.com)**

**Vice Chair: Alla Deronja (aderonja@atcllc.com)**

**Output: IEEE Report**

**Established: May 2007**

**Expected Completion Date: May 2011**

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

Working group C14 met on May 17, 2011, in Asheville, NC, in a single session chaired by Jim O'Brien with 13 members and 29 guests present.

The chair distributed the latest draft of the Report, and the latest received assignments and comments were discussed.

Rick Taylor provided a write-up on a case study in New Orleans. Its current placement in section 5.9 *Alarms for encroachment of relay trip characteristics* did not appear appropriate. Jim will talk to Rick to get a one-diagram for the write-up and decide whether it should be moved to section 2.3 *Why utilities would use Synchrophasor Measurements*.

There is an issue with the limits of the data loss and the reference for the communication infrastructure requirements in section 3.1 authored by Ken Martin. Jay Murphy will follow with Ken to resolve this issue and report to the chair.

Section 5.12 *SIPS* contained material, which the working group felt was already addressed in other sections, such as synchrophasors application to out-of-step protection (can be integrated with the material in section 5.10), synchrophasors application to line differential protection (can be integrated with the material in sections 5.3 and 5.4), and synchrophasors application to multi-ended fault location (can be integrated with the material in section 5.8). Jim will review these recommendations and update the report draft accordingly.

Additionally, Demetrious Tziouvaras will expand on synchrophasors application to controlled islanding, also currently residing in section 5.12, and will recommend its alternate placement, most likely in section 5.10 *Adaptive Out-of-Step Protection*.

Section 5.12 then can be eliminated.

Figure 2.1 on page 4 will be revised to be titled *CT ratio correction factors*.

Alex Apostolov will contribute a write-up to address different synchrophasor measurements – for metering and for protection. This report is based on the protection synchrophasor measurements so this is important to mention in the report. Also, Alex will write about latency and time synchronizing requirements for the protection synchrophasor measurements based on the IEC standard 90-5.

An earlier proposed topic on generator monitoring angles from the Chinese PMU specification will be addressed by reviewing Annex F of the IEEE Standard C37.118 and, if available, be placed under general section 4.0 on *Present Applications*.

New writing assignments are due by July 1<sup>st</sup>, 2011.

Mike Starke and Haile Gashaw volunteered to provide the final editing of the complete report.

The report nears completion, and the working group hopes that the next meeting in September of 2011 may be the last.

**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 in single session in Asheville, North Carolina on Tuesday, May 17, 2011 with 8 members and 11 guests attending. Vice chair Yi Hu presided the meeting. January 2011 meeting minutes was approved by the attending working members. Copies of the current draft report were distributed.

Prior to the meeting, the working group chairs have received contributions from working group members that substantially completed the draft report. The discussion of the draft centered on how the report sections should be organized. The working group reviewed the scope of the assignment and the original planned report structure, discussed the preferred ways to organize and finalize the report. The conclusion was to not to use exactly parallel organization for the discussion of each separate SIPS, since SIPS tend to serve quite different purposes. Working group chairs will create a revised version according to agreed report organization. It will be distributed to section authors for review and comment. An updated version incorporating section authors' comments will be distributed to report reviewers for reviewing the entire document and provide comments. The report incorporating all comments from full document reviewers will be distributed to all members before next meeting for final review and discussion at next meeting.

Four more people (Art Buanno, Yuan Liao, Steve Kunsman, and Stephan Brettschneider) volunteered for reviewing the entire document with Gene Henneberg, Joshua Park - SCE, Alla Deronja, Mohammad Zubair who had volunteered at last meeting.

Mr. Roger Wittaker presented and described the Dynamic Brake Scheme used in the Bonneville Power Administration system.

**Next step actions:**

Next step actions before September 2011 PSRC meeting as follows:

- WG Chairs to create a new version of the draft report and distribute to section authors – 1 week
- Section authors to review and provide comments – 2 weeks
- WG Chairs to update draft to incorporate section authors comments and distribute the updated draft to full document reviewers – 4 weeks
- WG Chairs to edit and distribute updated draft report before next meeting

The working group will meet at the Minneapolis, MN Sept 12-15, 2011 PSRC meeting in one session to review the next draft of the report.

**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 Wednesday afternoon with 24 attendees. Fifteen working group members were in attendance.

Draft 2.5 of the paper was discussed. Several sections of the paper were assigned for revision.

A request will be made to revise section 1.1.1 to cover just DC circuit redundancy.

Ken Behrendt will revise paragraph 1 of section 1.2.1

Don Lukach and Robert Frye will revise 1.2.2 on the discussion to balance wiring versus increased functionality

Jerry Johnston will revise paragraph 3 of section 2.6.1

All assignments are due by June 30.

Discussion also centered on how well the paper as it stands adequately fulfills the scope and assignment of this working group. The chair and vice-chair will look at the document to determine how best to assure the report gets and remains on track. A recommendation to the working group will be prepared on or before the next meeting.

#### **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 PSRC C-17 Work Group met in a single session at the PSRC meeting in Asheville, NC on Wednesday May 18, 2011 with 25 members and 31 guests.

Dean Miller reviewed the status of the report and writing assignments. Additional people volunteered to write descriptions for the Type IV and V units. Report assignments are as follows:

1. Introduction
2. Wind Plant Electrical Layout – Michael Stark, Travis Smith
3. Generator types and response to faults –
  - Type I, Ron Harley, Michael Stark
  - Type II, Sukumar Brahma
  - Type III, Zeeky Bukhala
  - Type IV, Isabella Snyder and Omer C Onar
  - Type V, Brian Boyson
4. Equipment Fault Current Interrupting – Steve Conrad
5. Protective Relay Response Issues – Jim Niemera and Dean Miller
6. Data Requirements – Charlie Henville (transmission), Doug Hunchuk (collector systems)
7. Actual Performance / Experience – Dean Miller and Charlie Henville
8. Conclusions

Dean reviewed several sections of the draft paper (distributed to members about one month ago), including typical collector systems configurations: low voltage ride through (or lack thereof), collector substations fault duties, and grounding transformer configurations. Transmission

Providers monitor the wind plant at the point of interconnection (POI). Wind can't be scheduled but can be predicted as part of a normal generation mix.

Charlie Henville observed that recently constructed wind farm fault contributions seem to have an extended duration compared to earlier plants. This is probably due to the low voltage ride through requirements which the newer plants meet.

Meyer Kao questioned operation of wind plants during stressed system conditions, e.g. 0.85 per unit voltage. The WECC low voltage ride through criterion may provide insight for this issue. Meyer also had some questions about relay loadability for wind farms which this discussion did not resolve.

The next joint work group meeting will be at the PES General Meeting in Detroit, MI, July 28. The next C-17 work group meeting will be at the PSRC meeting in Minneapolis, MN, September Sept 12-15, 2011.

**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 did not meet in Asheville. However, an invitation from the PSDP to participate in a panel session on Power System Restoration Dynamics at the PES General Meeting in 2012 was discussed at the Subcommittee C meeting. It was agreed that one or two members of the PSRC working group that produced the 2005 paper on protection issues during power system restoration could commit to participation in this panel session.

Alex Apostolov and Pratap Mysore were both members of the PSRC working group that produced the 2005 paper, and both of them agreed to participate (if two PSRC participants are required instead of one). At the July 2011 PES General Meeting, Charles Henville will discuss with the PSDP more about the plans for the panel session and report back to the PSRC. At the September meeting of the PSRC specific panellist(s) and outline(s) of the presentation(s) will be discussed and agreed upon.

CTF3 will meet at the September PSRC meeting to firm up plans for the PSRC participation in the panel session.

**D: LINE PROTECTION SUBCOMMITTEE**

**Chair: R.W. Patterson**

**Vice Chair: G.L. Kobet**

The Subcommittee meeting was called to order at 8:00 a.m. with 26 members and 44 guests present.

Following introductions, a count of SC membership was made, and it was determined a quorum was present (26 out of 46 members present).

Minutes from the January 2011 meeting in Atlanta 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, May 17, 2011, in a double session. There were 22 of 35 WG members present and a quorum was achieved. Thirty-four guests attended the meetings, and two of the guests joined the WG as new members.

The IEEE patent requirement slides were presented, and attendees were given the opportunity to identify any known patent claims. A new holder of potentially essential patents was declared. Chair Kobet will issue a request for a Letter of Assurance to this holder.

The D2 meeting notes from the January, 2011 meeting held in Atlanta, GA were reviewed and approved without modification.

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

Brenda Mancuso, IEEE-SA, reviewed the procedures to create an IEEE web account and access the IEEE Mentor document repository site for this working group. Brenda will send an email to Chair Kobet with the instructions for creating a web account and accessing Mentor. All WG members are requested to set up access to the D2 Mentor site as soon as possible.

WG members will use an Excel spreadsheet to provide comments during initial balloting, which Chair Kobet will provide on the Mentor site.

Copies of draft 3.1 of the guide were distributed to WG members. Chair Kobet reviewed the assignments listed in the January 2011 minutes/outline, the comments contained within draft 3.1, and the negative ballot comments/resolutions spreadsheet. Chair Kobet recorded many of the resolutions of comments in the draft document -- other specific assignments as a result of the discussion include the following:

Gary Kobet will make the following updates to the guide:

- Contact Jon Gardell and incorporate a reference to the work done by WG J9 in clause 4.4.6 (Reclosing and Motor Loads).
- Move clause 6.1.1 (Common considerations for autoreclosing) to a new sub-clause of 6.3 (Application considerations).
- Move clause 6.2.1.2 (Out-of-step and power swing coordination) and incorporate with information that exists within clause 6.1.1.2 (Blocking of autoreclosing).
- Move clause 6.2.5 (Point-on-wave and Staggered Pole autoreclosing) to new clause 7.6. Existing clause 7.6 (Pulseclosing) will be incorporated with this information as a sub-clause. In addition, the terminology will be changed from Pulseclosing to a more generic name.
- Move clause 6.3.1 (Radial circuits) to a new sub-clause of 4.6 (Application considerations). In addition, remove the reference “synchronous” used for large motors in this clause.
- Add a reference in clause 6.3.2 (Guidelines for setting synch-check angles) to a paper that describes the impact phase angle difference has on power flow and generator turbine shaft torque.

- Update the guide to consistently use the terminology “live-line” and “live-bus” instead of “hot-line” and “hot-bus”, which is consistent with the IEEE Standards Definition Database.
- Provide a one-line sketch for clause 6.3.13 (In-line breaker) to Adi Mulawarman.
- Update the guide to incorporate all pending editorial comments listed on the negative ballot comments/resolutions spreadsheet.
- Move clause 6.3.4 (Lines with automatic sectionalizing) and all examples to clause 4.6 (Application considerations). In addition, Robert Frye will review clause 6.3.4 (Lines with automatic sectionalizing) to determine if any information is limited to transmission system application and should remain
- Phil Waudby and Martin Best will review clause 5.3 (Autoreclosing coordination practices) against the Distribution Protection guide for conflicts.
- Ken Behrendt took on the assignment on creating a diagram for clause 4.4.1 (Autoreclosing supervision, General).
- Greg Sessler will provide a sentence to incorporate his comment of clause 4.6.1 (Lines with cables).
- Phil Tatro and George Bartok will revisit and review clause 6.3.2 (Guidelines for setting synch-check angles), including incorporating Tony Seeger’s comment and considering adding sub-clauses to better organize the information.
- Adi Mulawarman volunteered to redraw of the guide figures according to IEEE style guidelines for figures.
- Don Lukach will rewrite the last paragraph of clause 6.3.6 (Multiple terminal lines), and Tony Seegers offered to review the revisions.
- Greg Sessler will create a one-line sketch for clause 6.3.10 (Transformers).
- Charlie Sufana will provide a diagram for clause 7.1 (IEC 61850 applications to autoreclosing), bullet 3. In addition, he will modify the text to change the breaker number designations to a single digit (number or letter).
- Bruce Maki will address negative ballot comment #1 by incorporating the proposed change into existing clause 5.3.2 (Sectionalizers).
- Jun Verzosa will investigate MPAR (Multi Phase Auto Reclosing), which is widely used in Japan, Korea and Taiwan. He will provide a brief write-up of this technique that may be included in the guide.

Writing assignments are due June 15<sup>th</sup>. Mid-July is the target for initiation of the WG comment period, and WG comments would then be discussed at the September meeting.

The working group adjourned by general consent at 12:15 pm ET.

**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 Wednesday May 18th, 2011 at 4:30 PM with 13 attendees, of which 6 are members

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

Writing assignments assigned from the previous meetings were discussed.

Art Buanno of Reliability First regional reliability council discussed polarizing problem Reliability First had encountered. He indicated a significant percentage of relay misops are associated with polarizing problem. The working group has asked Art to ask some of the utilities if they are interested in sharing lessons learned from the misop due to polarizing.

Meyer Kao presented an example where the negative sequence polarizing method is inadequate.

Russ Patterson discussed the writing assignment concerning where the tertiary winding is not a suitable source for polarizing reference.

Robert Frye have requested a section in the report discussing how does short circuit program, such as Aspen and CAPE, verify polarizing for different relay models.

**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: 1.4**

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

The D6 working group met on Wednesday, May 18, 2010 at 3.00 pm with 8 members and 7 guests present.

Draft 1.4 of the document was sent to the members prior to the meeting, and hardcopies were handed out for the guests at the meeting.

Discussion was held on the need to refocus the efforts of this group back to the original intent of the assignment. It was agreed that the target audience should be relay engineers already schooled in the basics of power system modeling and focus on the required accuracy of the models and on how to verify the accuracy of this model.

Demetrios Tziouvaras has agreed to provide an example of effects of how certain changes affect the model. It is intended that this can be expanded to show how various changes in modeling assumptions and parameters affect the model.

**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

The Working group met on May 18, 2011 in one session with 12 members and 14 guests in attendance. Meeting quorum requirements were not met. Meeting minutes will be sent out via e-mail for approval.

In the absence of both the Chair and the vice-chair of the working group, the session was chaired by a WG member, Pratap Mysore.

Pratap conveyed the information e-mailed by the chair on the progress made on the guide since January 2011 meeting. Here is the summary:

- The draft 5.2 of the guide was balloted in Feb-March 2011.
- Affirmative votes with or without comments = 109
- Negative votes with or with comments = 9
- Abstentions because of Lack of Expertise (1) and Lack of Time (3) = 4
- The Affirmative votes are 109 out of 118 (92%)
- A file containing the comments submitted by the balloters was sent by email to the WG members on March 11, 2011.
- The WG also formed the following Ballot Response Team at the January 2011 Meeting. The following members volunteered to help with resolving the comments: Martin Best, Randy Cunico, Pratap Mysore, Jim O'Brian, Dean Ouellette, Mohindar Sachdev, and Rick Taylor
- Most of the editorial comments were addressed by Mohindar and a revised draft containing the changes was distributed to the ballot review team on March 15, 2011.

Most of the discussions in the meeting were on the process of response to 362 technical comments and the response to nine negative balloters.

After a long discussion, it was suggested by the membership form a group of volunteers to go through the comments and update the word document and the excel spread sheet and e-mail back to the WG chair by June 15, 2011. The volunteers and their assignments are:

1. Rick Taylor and Mike McDonald - comments pertaining to pages 1-33
2. Jim O'Brien and Ian Tualla - comments pertaining to pages 34-66
3. Tom Wiedman and Greg Sessler - comments pertaining to pages 67-99
4. Walter McCannon and Tom Austin - comments pertaining to pages 100-130
5. Dean Ollette - comments pertaining to pages 131- till the end

It was suggested that the volunteers receive Microsoft Word copy of the latest draft of the guide for incorporating the changes in response to the suggestions of the balloters. At the conclusion of this business, the meeting was adjourned.

#### **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 5.5**

**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 Wednesday with 13 members and 21 guests present, including 1 new member – Claire Patti.

Minutes from the January meeting in Atlanta were reviewed and approved.

The document was reviewed and discussed with the following changes:

Add the one line diagram referenced in Section 3.1 as Figure # (illustrated on the web page).

Move most of section 3 into section 2.3 as part of Today's Distribution Automation Applications, section 3.6 will become section 2.4.

Sections 3.3 and 3.4 (now as part of 2.3) will be revised to provide better flow and reference the one line diagram – Claire Patti volunteered to coordinate this with Don Lukach and Pat Carroll.

Fred will investigate the feasibility of adding the Duquesne Light Company history as a link, if not it will be included as an annex.

Writing assignments are due on June 30.

**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 May 18, 2011, in Asheville, NC, in single session chaired by Alex Apostolov with 7 members and 11 guests present. 1 guest joined the WG as a member.

Alex requested Phil Beaumont, who is a secretary of the IEC TC95 MT4, to give a report of the IEC 60255-121 standard development progress.

Phil reported that the IEC TC95 MT4 met in Austria last week. MT4 is aiming for the spring of 2012 for the release of the final draft of the standard. The team still has a number of comments to address before the next meeting in London in December. They will be addressed via phone conferences and emails by the June 15th targeted date, and an updated standard draft should be available by the end of June for circulation.

At the meeting in Austria, most of the comments addressed were from Canada, Japan, and Sweden. There were no comments from USA. The USA comments were addressed earlier at the Seattle 2010 meeting. Some of the comments concerned the CT requirements and testing equipment and aspects.

A copy of the updated draft will be sent to D21 WG members. Everyone is encouraged to submit any further comments to the WG vice-chair so they can be sent to Murty Yalla for consideration. Given that the standard is nearing its completion, the comments should be submitted as soon as possible.

**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 January 12, 2011 at 8:00 am at the Marriott Renaissance with 8 members and 5 guests. WG stands at 24 members.

Illa Voloh presented the analysis of an event in Brazil which included the operation of two zone 1 relays during a system disturbance that included frequency decay. The zone 1 relays operated during a decrease in system frequency and was attributed to the use of the relays' use memory voltage.

Jun Verzosa presented the changes made to the Comtrade Calculator based on Bogdan Katzeny's WG ballot comment. The signal model has now been updated to eliminate step changes of the rate-of-change of frequency by using a (quadratic equation as "glue" between the two frequency lines to make the test be more realistic. Illa Voloh worked with Jun on this change to the calculator.

Several comments from the ballot were included in the paper. The conclusions reached in section 5 will be a part of the paper's introduction and this section will be deleted from the final draft as a way to further shorten the paper.

The WG chair requests at this time to ballot the Transmission Line SC during the summer. The WG will then be able to discuss and resolve SC comments in the September meeting.

**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 2011**

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

The working group met with 15 members, 11 guests, for a total of 26.

The January, 2011 meeting minutes were approved as submitted.

The working group discussed the addition of a figure that supports text about a misoperation that was due to mutual coupling. Also discussed was the inconsistent use of "50" versus "67" throughout the report.

Rick Taylor gave a presentation of a conference paper that he developed, based from the current D24 report. The presentation used terminology of "POC" (Point of Coordination) which led to much group discussion about different points of view for POC and consistency of methodology. The working group chairman agreed to compile the information and revise the report to include this topic.

All working group members were asked to review the current Draft G of the report by June 30 for any technical or editorial comments, with the expectation that Draft H of the report will be issued by the end of July, 2011. The intent is to allow ample time for working group membership review of the Draft H prior to the September meeting.

**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 Asheville on May 17, 2011 at 3:00 PM with 6 members and 10 guests.

The Chairman and Vice Chairman were unable to attend the meeting and Working Group member Joe Mooney presided over the meeting with assistance from Gary Kobet.

Introductions were followed by a review of the January meeting minutes.

Cristian Paduraru reviewed his contribution on Ferroresonance with the attendees of the meeting. The section is included in the latest draft of the report. Cristian described an application using auxiliary vts that resulted in ferroresonance and an undesired operation. He also covered the solution to the problem which was to specify auxiliary vts with a higher saturation value.

Outstanding Working Group assignments were reviewed:

Damion Tholomier and Alex Lee volunteered to review paper as it exists and provide suggestions.

Eli Pajuelo agreed to review section 3.1 on CCVTs.

Ian Tualla agreed to review to review section 3.2 on CT Saturation.

Don Sevcik volunteered to write a section on supervisory elements.

Current writing assignments and review comments are due by end of July, 2011..

**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.

The meeting convened at 1:30pm in the Swannanoa room with 10 members and 10 guests with WG Chair Joe Mooney presiding. There are 25 members on the Working Group.

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.

There was not a quorum and minutes from the January meeting in Atlanta could not be approved, therefore, the meeting minutes will be approved via email.

Brian Boysen of WE Energies made a presentation on their application of bus relays for fault location on distribution systems. Their experience in distribution fault location has been very good; approximately 90% of faults are properly located. There was a good discussion by the group concerning their results and the general consensus was that their application and experience

would be a good addition to the guide. Brian and Pat Carrol volunteered to draft a section describing their application for the distribution section for review by the WG.

Yanfeng Gong or SEL volunteered to present the application and results of a pilot distribution project as well and a doubled-ended application at the next meeting.

Working group assignments were reviewed with members in attendance. Please complete working assignments and send them to the WG chair by August 15, 2011. As a reminder, working assignments are as follows:

- Rafael Garcia, Damier Novosel, Arvind Chaudhary and Mansour Jalali: Definition of error. Explore the issues such as traditional definition vs. existing guide definition, applicability to both loop and distribution systems and what is predominant industry practice, etc.
- 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.

Action Items for next meeting:

- Volunteers noted in the minutes, please provide assignments by August 15, 2011.
- All members READ THE GUIDE.
- Yanfeng Gong to present on fault locating applications.
- Bring new ideas in fault locating..

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

**Chair: Ryland Revelle**

**Vice Chair: Solveig Ward**

**Output: IEEE Guide PC37.243**

**Established: May 2010**

**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 19 members and 17 guests. A quorum was not obtained (50 total WG members) and the meeting minutes from January will be approved via email.

Timothy Day gave a presentation on a project that was done that used Rogowski coils to implement a line current differential scheme. A discussion of the operating principles, the communications, and the prevalence of such schemes ensued. The general consensus was that use of such a scheme is not widespread, but that discussion of such a scheme may be beneficial in an Appendix to the guide. Ljubomir Kojovic volunteered to write a one page description of such a scheme for use in future discussions by the working group.

Further review of the outline was done with fifteen members of the WG volunteering to write sections. A small task force was also assembled to develop a base of reference documents and continue further work on the outline prior to September’s meeting.

Solveig Ward mentioned the idea of making use of the technological tools available at the IEEE SA MyProject website as an aid for the WG to continue work between PSRC meetings. This was agreed upon and will be pursued further

In the absence of the WG Chair and Vice Chair, WG D27 held an informal meeting on Tuesday 1/11 led by the WG member Solveig Ward, assisted by WG member Sam Sambasivan. The meeting was attended by 12 members and 8 guests.

Three guests signed up as new members: Alex Lee, Ian Tualla and Phil Beaumont.

The WG reviewed a draft document relating to current differential in order to develop an outline and define what should be included in the guide. While the focus of the guide will be digital current differential relaying over digital communications media, it was suggested that other line differential applications may be mentioned briefly for informational purposes. Examples could be analog electromechanical relays over digital channels or digital line differential relays over analog channels.

A draft to an outline was produced, where applications were discussed and writing assignments handed out. The outline is still lacking in regards to communications related issues.

Assignments due to the chair by mid April:  
Differential principle (brief generic description) – Ilija Jankovic  
Charging current compensation - Gustavo Brunello  
CT saturation detection / compensation – Sam Sambasivan  
Stub bus - Sam Sambasivan  
GPS synchronization - Phil Beaumont

Solveig Ward has provided the outline draft to the WG chair.

### **Coordination Reports**

None

### **Liaison Reports – Fred Friend**

T&D Committee / Distribution Subcommittee

The items of interest to the Line Protection Subcommittee from the 2010 IEEE PES Joint Technical Committee Meeting, Atlanta, GA:

The next T&D Committee / Distribution Subcommittee meeting will be at the PES General Meeting in Detroit, MI 24-28 July 2010.

Working Group on Distribution Automation:

- Plan to have three panel sessions at the General Meeting in Detroit:
  - "Smart Distribution Grid Applications and Components"
  - "Smart Distribution Demonstration Projects"
  - "Integration of Distributed Energy Resources (DER)"
- Continue work on developing Distribution Automation publications
  - IEEE Book on Distribution Automation
  - Smart Distribution Systems WIKI  
[http://wiki.powerdistributionresearch.com/index.php?title=Main\\_Page](http://wiki.powerdistributionresearch.com/index.php?title=Main_Page)
- Task Force meeting on Volt-VAR control

Working Group on Switching & Overcurrent Protection:

- PAR was approved P1806 "Guide for Placement of Overhead and Underground Switching and OC Protection Equipment"
  - Scope: This guide is to provide 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.

### **Old Business**

None

### **New Business**

None

### **General Discussion**

Solveig Ward mentioned that working group reports on completion should be earmarked for potential publication and sale by the IEEE/PES. They would be free to PSRC members but sold to all others.

Alex Apostolov suggested to those completing WG assignments they should consider submitting articles summarizing their work to PAC World magazine for potential publishing in future editions of the magazine.

Ken Behrendt mentioned a NERC Advisory on Preparing for Geo-Magnetic Disturbances (see [http://www.nerc.com/fileUploads/File/Events%20Analysis/A-2011-05-10-01\\_GMD\\_FINAL.pdf](http://www.nerc.com/fileUploads/File/Events%20Analysis/A-2011-05-10-01_GMD_FINAL.pdf)). Part of this Advisory recommends evaluating “negative-sequence-current relay settings on transformers, generators, and transmission lines to determine if adjustments are needed which could be elevated due to high harmonic current levels”. The Advisory mentions a couple other recommendations on reviewing relaying. The SC briefly discussed the possibility of creating a task force to investigate these issues. Ken agreed to research the Advisory; further discussion will follow in the SC meeting in September.

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

Meyer Kao presented an operation on a transformer terminated line. The transformer is an autotransformer and as such is a zero-sequence source. Meyer’s discussion focused on potential problems with the use of negative sequence polarizing and non-directional carrier start in a directional comparison blocking (DCB) scheme. The problems arise when a phase-to-ground fault occurs on the line when the breakers at the transformer location are open. The autotransformer sources zero-sequence current which will result in the initiation of a blocking signal if the line relay is fed from CTs on the windings of the transformer connected at line potential. This could result in unnecessary time-delayed clearing from the remote terminal.

Potential solutions include using zero-sequence polarizing and using directional carrier start.

The meeting was adjourned at 9:15 a.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 Timelnaccuracy 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 expects 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 May 19, 2011 with 28 members and 19 guests present – a quorum was achieved.

- Approved minutes of I SC meeting held in Berkley, CA in September, 2010.
- Approved minutes of I SC meeting held in Atlanta, GA in January, 2011.
- Items of Interest
  - If a WG meeting is going to be a short one please inform SC Chair or Vice Chair.
  - IEEE Mentor is a new service to facilitate standards development whereby documents are kept on an IEEE web page.
  - Looking for presentations for main meetingStarting in September there will be one meeting format going forward – Monday afternoon meetings starting at 3pm, ending 12 pm Thursday

### **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 did not meet The I2 working group, chaired by Mal Swanson, met on Wednesday, May 18, 2011 with 9 members, including 1 new member – Claire Patti.

Minutes from the January meeting in Atlanta 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 with more up to date information available since this working group met during the last meeting time slot.

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.

## **I3: Relay Functional Type Testing**

**Chair: Jerry Jodice**  
**Vice Chair: Bryan Gwyn**  
**Output: Report**  
**Completion Date: September 2011**

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

Working Group I3 met as scheduled Tuesday 17 May, 2011.

Four members and six guests attended a short session, at which the Chair presented the status of WG activities.

Via email, the Chair had previously distributed the final version of the Report “Functional Scheme Testing”, V 9.1 to all members. Each member was requested to review the document, submit any required additions/corrections, and provide a ballot accepting or rejecting the Report.

There were few minor changes, all of which were implemented.

100% YEA ballots were received.

The Report has subsequently been transmitted via email to the Chair of I SC for Subcommittee balloting.

The WG will remain active to respond to all comments from I SC members, so all additions/corrections may be implemented and the Report balloted.

PS: During the Main Committee meeting, Vice Chair Bryan Gwyn will present the scope and activities of the WG, and provide a summary of one of the Functional Case Studies in the Report.

#### **I4: IEC Advisory Working Group**

**Chair: E.A. Udren**

**Vice Chair: M. Ranieri**

**Output: Comments and votes to USNC of IEC on TC 95 (Measuring Relays) Standards projects and drafts. Reports to PSRC on IEC standards development.**

**Meeting: WG meetings are continuing**

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

The WG met on May 17, 2011 with 8 attendees and discussed recent TC 95 documents:

- CD of 60255-149, Functional Requirements for Thermal Electrical Relays – This is one of the new TC 95 functional documents by Maintenance Team 4 under Murty Yalla. The scope is thermal electrical models mainly for motors, with inclusion of generators and transformers. The WG reviewed the document, which does a good job of describing the modeling equations and the means for specification without restricting the ability of relay designers to offer new modeling and protective functions. However, after the meeting, the Chair noticed that the modeling did not characterize the inclusion of service factor, a standard motor nameplate parameter impacting thermal protection settings. The WG had no other comments; the Chair submitted this comment on service factor by the deadline of May 24.
- CD of 60255-121, Functional Requirements for Distance Relays – this document is reviewed in WG D21. There were no comments either from D21 or from I4 members, so a vote of approval was submitted to IEC by May 24. This acceptance is in stark contrast to the previous CD for which the US submitted nearly 50 pages of comment tables. The IEC MT did a lot of work to address issues since then.
- The Chair reviewed the results of the first meeting of the IEC WG under Convenor Ken Martin and developing the IEC Synchrophasor [measurement] Standard, to be called 60255-118-1, This new development by the joint IEC-IEEE WG was proposed by the US at the TC 95 meeting last October; the project was approved in NWIP vote. The first meeting took place in

Ashville on May 16, just before the PSRC. The WG reviewed initial international comments and asked NC representatives from China and Japan to get more detailed feedback on what changes those NCs sought. Mostly, the IEC standard is expected to be identical to (if possible) or technically equivalent to IEEE C37.118.1 now up for IEEE SA vote. After IEEE publication, the C37.118.1 text will serve as the basis for IEC 60255-118-1. The next meeting has not been fixed, but will occur later in the year after IEEE C37.118.1 approval.

## **15: 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 1:30 with 10 members and 10 guests attending. Two guests volunteered to become members and were accepted.

Chairman Kevin Donahoe opened the meeting with introductions, and reviewed our assignment.

The January meeting was discussed, although the printed minutes were not available.

Writing assignments from the last meeting were presented and discussed. Several items of repetition within the report were noted. For example, DC Schematics are defined several times in the document. The next draft will identify all the various types of drawings in the beginning, including the various terminologies used for the same type of drawing. One description will then be used to refer to each type in the rest of the report.

There was a discussion on whether we need to write about the "life cycle" of a schematic, i.e., when a schematic is created, when it is revised, and how long it is retained? The group decided it was not necessary.

There was much discussion about logic diagrams especially whether it is effective to maintain them in printed form. The logic is resident in the relay and software can display it in a Boolean logic diagram. It was pointed out that the relay testers need to know how the relay is intended to perform, but often the drawings are not revised if there are changes to the logic, either because there were errors in the original or the function of the relay was changed during commissioning. Also, it may be important for NERC auditing purposes to document the existing logic. And we need to be aware that there are non-protection people using these drawings for other purposes. It was decided to leave the topic in the report, and to stress that the as-built process must be followed to ensure that the diagram matches the in-service relay.

It was pointed out that some of the drawings submitted by Dolly Villasmil were not readable and could use pertinent descriptive text as to what they are intended to illustrate. We will investigate having them scaled for 11 X 17 inch format and placed in an appendix. John Appleyard volunteered to make some blowups to show pertinent information but he will need the originals of the drawings in pdf format. Jack Jester will send John copies of the "E" drawings. Andre Uribe will work with Dolly to get the "A" drawings to John.

Some diagrams are labeled "elementary." We need to add "elementary diagram" as a type and define it in the beginning of the report.

Another type of drawing is labeled a "Protection Zone Diagram." It is often used as part of an operating manual. Andre Uribe volunteered to write a section on Protection Zone Diagrams. Don Ware volunteered to work with him.

Tony Seegers still owes a section on the use of tabular databases to represent complex relay to relay logic. Greg Sessler had previously volunteered to help him with that.

Duane Buchanan volunteered to send some one-line drawings.

The assignment for everyone will be to review the overall document for omissions, repetitions, inconsistencies, and to reference drawings to the pertinent text.

We are pushing to complete the report by the January, 2012 meeting, so it is important that the writing assignments are submitted promptly. We ask that the assigned tasks be submitted by July 15.

The meeting was adjourned at 2:45.

Review of assignments:

1. Jack Jester and Andre Uribe will provide pdf copies of the drawings to John Appleyard.
2. John Appleyard will adjust the drawings or sections of the drawings for readability.
3. Andre Uribe and Don Ware will write a section on protection zone diagrams.
4. Tony Seegers and Greg Sessler will provide a section on the use of tabular databases.
5. Duane Buchanan will provide some additional one-line diagrams.

Everyone will review the overall document to eliminate repetitions and inconsistencies, identify omissions, and tie drawings to the pertinent text.

**I6: Practical Aspects of Rogowski Coil Applications to Relaying**

**Chair: Ljubomir Kojovic**

**Vice Chair: Bob Beresh**

**Output: Special Report to the PSRC**

**Date: 13 January, 2010**

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

Working group assignment is completed. Motion to disband working group approved.

**I8: Revision of C57.13.3 - Guide for Grounding of Instrument Transformer Secondary Circuits and Cases**

**Chair: Brian Mugalian**

**Vice-Chair: Bruce Magruder**

**Established: 2009**

**Output: Revision of IEEE/ANSI C57.13.3-2005**

**Expected Completion Date: 2012**

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

Working Group I8, Revision of C57.13.3 - Guide for Grounding of Instrument Transformer Secondary Circuits and Cases, was held in Eagle, Renaissance Asheville Hotel, Asheville NC on May 18, 2011. Thirteen members and four guests were present.

The working group reviewed recently received suggested changes to the guide from Bruce Pickett and Gary Kobet. These changes will be incorporated into the first draft of the revision. A draft will be available and placed on the I8 secured web page by August 1.

The Working Group will meet in September 2011 in Minneapolis, MN.

**I9: Revision of C37.105 Standard for Qualifying Class 1E Protective Relays and Auxiliaries for Nuclear Power Generating Stations**

**Chair: Sahib Usman**

**Vice Chair: Roy Ball**

**Output: Revision of Standard C37.105**

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

No report. Working group is to write a summary paper.

**I10: Revision of C37.98 Standard for Seismic Testing of Relays**

**Chair: Marie Nemier**

**Vice Chair: Munnu Bajpai**

**Suresh Channarasappa – Co –Chair SC-2**

**Output: Revision of Standard C37.98**

**Assignment:** Revise and update C37.98

No report.

**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 (5) IEEE Copyright and WG Guidelines slides with no issues reported by the attendees. That was followed by a welcome and introduction of attendees, a discussion of the agenda, and then focused on WG topics of interest.

There was then a detailed discussion of the Review and Consolidation Process that the Working Group is following for the sections in the Guide. There are 11 (eleven) individual Sections that will be combined into a single document. May 31<sup>st</sup> is the target date for having the latest version of the material for each Section sent to the WG Web Master and the Chair. This is a key step so that the consolidation can be started.

In the meeting five (#5) Team Leaders led an in-depth discussion on the status and action plans for their specific Section. An update on the WG Web site pointed out that all the previous link problems have been resolved, all the previous postings are available, and they will be replaced with the latest material that will be available by the end of May.

Other topics of interest 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
- Suggestions for other topics to include in the Guide were discussed.

**I17: Trends in Protective Relaying Performance**

**Chair: Mark Carpenter**

**Vice Chair:**

**Output: Periodic Reports to Subcommittee**

The WG did not meet. The WG has been disbanded

**I18: Anomaly Checks for Relay Settings**

**Chair: Peter McLaren**

**Vice Chair: Mukesh Nagpal**

**Output: Report to main committee**

**Expected Completion Date: TBD**

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

The WG met for a single session with 4 members and 11 guests.

The chairman indicated that he had received 3 comments on the text from the sub-committee. He had incorporated these comments into the report and circulated it to the WG members. There were no significant changes.

The sub-committee chair mentioned that we had not yet reached the 75% approval rate required in the sub-committee and both he and the WG chairman would be encouraging non voters on the sub-committee to return their votes.

**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 twelfth meeting of the Working Group (WG) I20 met on May 17, 2011, in a single session with 8 members and 2 guests.

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

The minutes of meeting #10 in Berkeley on Sept. 14, 2010 and meeting #11 in Atlanta on January 11, 2011 were approved as submitted.

The Working Group discussed and approved final revisions implemented into Draft 5. Revisions included editorial changes to Clause 4.1, and a change to the waveform descriptions in Clause 4.2 to better define the test generator output impedance, while maintaining harmonization with the applicable IEC standards.

John Tengdin, Chairman of IEEE Std. 1613, had requested a few revisions to the C37.90.1 to acknowledge that “The testing of data communication ports and their acceptance criteria are defined in IEEE 1613 Standard”. This request comes from his work on IEEE Std. 1613. He wrote on May 15, 2011:

“Since 2007, the Scope of IEEE 1613, as published by IEEE SA, has included the words “and communication ports in protective relays.” And from its first publication in 2003, before its scope was broadened to include these ports, its transient test waveforms and application details have been identical to the relevant PSRC standards. In March 2011, the IEEE Standards Board approved a new PAR – with a broadened Scope to include the comm. to Smart devices where ever installed in an electric power facility. Following is the new Scope statement in the draft 2011 revision to IEEE 1613:

“This document specifies standard service conditions, standard ratings, environmental performance requirements, and testing requirements for communications networking devices and communications ports in controllers, sensors and protective relays installed in electric power facilities. It does not cover such equipment designed for operation in other environments, such as office locations. Other than their communications ports, it does not cover such equipment used in protective relaying applications, for which IEEE Std C37.90™[B8], IEEE Std C37.90.1™ - **Error!**



**Reference source not found.**, IEEE Std C37.90.2™ - **Error! Reference source not found.**, and IEEE Std C37.90.3™ - **Error! Reference source not found.** shall apply.””

Because of this late request, and the need for ongoing discussion on the requested changes, the working group agreed to proceed as follows.

1. The Draft 5 of C37.90.1, will proceed to go to ballot.
2. The Substations Committee WG for IEEE Std. 1613 should finalize their Clause 6 with the review assistance of our C37.90.1 SWC Tests WG as requested. This will ensure that their document matches ours except for the clauses that the 1613 WG proposes to revise.
3. During the balloting process for C37.90.1 SWC Tests, the 1613 WG can submit comments based on their revisions from Clause 6 of IEEE Std 1613 that the Substations Committee WG has accepted.
4. The C37.90.1 SWC Tests WG will review and respond to comments on any clauses that the 1613 WG proposes that we revise.

A ballot of the working group by all in attendance, and by e-mail to all not in attendance, approved by 14 of 15 members (1 not voting), a resolution to proceed to ballot the Draft 5 standard.

A request for balloting of Draft 5 of the Revision of C37.90.1 - IEEE Standard for Surge Withstand Capability (SWC) Tests for Relays and Relay Systems Associated with Electric Power Apparatus can be presented to the main committee meeting on Thursday.

Jeff Burnworth will implement editorial corrections into Draft 5, prior to submittal for ballot.

**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.

Bruce Magruder has volunteered to be Vice-Chair.

Phil Winston will assign Brian Mugalian as Chair. The Chair will ask the I Subcommittee at the May 2011 meeting for permission to form a balloting body for reaffirmation of the guide.

The Task Force will meet in September 2011 in Minneapolis MN to review the comments received during the balloting process. This will determine whether there is a need to change the Task Force to a Working Group and submit a PAR.

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

**Chair: Jerry Jodice**

**Vice Chair: George Moskos**

**Output: Report**

The preponderance of system disturbances are successfully resolved by operation of the protection schemes. It is economically viable to direct expert analysis only to those disturbances which are not resolved as designed. That requires criteria by which digital records of waveforms and events in COMTRADE format may be categorized. These are the suggested categories;

- Operation successful; no further analysis required, NO REPORTING REQUIRED
- Operation suspect; MUST BE ANALYZED AND REPORTED and analyzed later, as time permits,
- Operation CORRECT BUT UNDESIRABLE not resolved as designed; requires immediate analysis to insure system INTEGRITY stability.

1. For uniformity of analysis; define methods suitable for determining root causes of those disturbances and Protection scheme operations which are not resolved as designed.
2. Create a guide REPORT by which protection, operation and control may collectively collaborate on corrective action based on REPORT guide parameters.

DEFINE A REPORTING FORMAT WHICH SATISFIES NERC REQUIREMENTS.

\*\*\*An important objective of this effort is to minimize the participation of company "experts" in the analysis of system events, with the goal of allowing those events requiring minimal expertise to be analyzed by lower level engineers.

The first meeting of the task force I TF 7 was scheduled Wednesday 18 May, 2011.  
Attendees included seventeen PSRC members, four of which initially registered as Members.

John Boyle presented three case studies of oscillographic waveforms, which led to the modification of the definitions of three categories of criteria as noted above.

It is clear by discussion that there will always be some events which do not conform directly to the three categories. These must be investigated thoroughly, without prior determination of expected result.

Jerry Jodice is proposed as Chair; George Moskos is proposed as Vice Chair ,both subject to approval by ISC.

The next TF meeting will be scheduled on September at which time the Scope must be defined for approval.

Reference documents have been offered by members with experience in these analyses, these will be distributed to all participants as soon as received, in preparation for discussion/inclusion at the next I TF meeting

#### **ITF10: Reaffirmation of C37.90 Standard for Relays and Relay Systems Associated with Electrical Power Apparatus.**

**Chair: Mario Ranieri**

**Vice Chair:**

**Output: Recommendation to the PSRC**

The standard was balloted and approved in March 2011. Work is completed

#### **Liaison Reports**

RE: Instrument Transformer Sub Committee, Liaison

Good Morning,

The Instrument Transformer Sub Committee spring meeting was in an Diego, CA.

There are two working groups. One is writing a standard for CTs with a mill-amp secondary.

The second working group is reviewing a number of important proposed changes for C57.13. The integration of C57.13.5 into C57.13 has run into major resistance. It appears a number of requirements in these two standards are in conflict.

*It appears the proposed large section on bushing CTs will become an annex to C57.13.*

#### **Coordination Reports**

None

### **Old Business**

None

### **New Business**

Discussions were held regarding a new Task Force to look at quality control guidelines for P&C design; the intent is that there be some guidelines for design. This may infringe upon other areas such as ISO 9001, but a TF will be formed for the next meeting to discuss.

### **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 Thursday, May 19, 2011 with 15 members (achieving quorum) and 8 guests. There was a call for the approval of the minutes of the January 2011 meeting in Atlanta, GA. Moved by G. Nail, 2<sup>nd</sup> by S. Conrad, 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 Transactions Paper draft has received necessary PSRC approval and is ready for submission to IEEE Manuscript Central.

#### **J2: Protection Considerations for Combustion Gas Turbine Static Starting**

**Chair: Mike Reichard**

**Vice Chair: Zeeky Bukhala**

**Established: 2005**

**Output: Report to the Subcommittee**

**Expected Completion: 2009**

**Status: Draft 2b (Final)**

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

The Working group did not meet at this meeting.

The report will soon be published on the PSRC website. Dale Finney volunteered to format the report into an IEEE transactions paper.

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

**Chair: Phil Waudby**

**Vice Chair: TBD**

**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 fourth Working Group meeting was held on May 17, 2011 with 15 members and 24 guests. The meeting was a double session.

Jon Gardell has resigned as the WG Chair. Phil Waudby, previously vice-chair, has accepted that role. The new WG Vice Chair has not yet been determined.

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 46, 50/27, 50BF, 51T/51TG, 51V and 81 O/U were reviewed.

Outstanding assignments are due by August 31, 2011. The WG will review the final assignments at the September 2011 meeting and have a draft of the report for review at the January 2012 meeting

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

**Chair: Joe Uchiyama**

**Vice Chair: Robert Frye**

**Established: 2009**

**Output: Transactions Paper**

**Expected Completion: TBD**

**Status: Fifth 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 working group met in Asheville on May 18, 2011 with nine members and eight guests.

Joe Uchiyama reviewed original Transactions paper entitled *Protection Issues Related to Pumped Storage Hydro* and offered to send it to all members via E-Mail.

Chairman stated to review assignments based on the previous meeting minutes.

Contact Information: Working group discussed some of the pumped storage contact list and facilities for which we had no contact that we could mail the questionnaire.

The rest of the meeting was spent for discussing each section of the questionnaire.

The following main comments and main points were received:

- a. Use bullets instead of essay type questions.

- b. The draft of the questionnaire shows common one-lines on questionnaire for respondents to select the closest one from the listed figures.
- c. Respondents are should be encouraged to provide a one-line, however, some utilities are not allowed due to confidentiality issues. For these utilities, then they should sketch their particular installation. Simplify drawings to show only topographic overview. Not necessary to show protective functions.
  - o Maybe draw a stick figure and get respondents to add VTs and CTs.
  - o We need to really focus questions on issues related to pumped storage.
  - o Potential question wording: What problems have you had after upgrading?
  - o Potential question wording: What did you do to enhance your pumped storage protection scheme or reduce components?  
  
What special function(s) did you apply the scheme or logic accomplish for the pumped storage site?
  - o Need to give examples for original question #12 before renumbering.
  - o Potential question wording: Did protection enhancement add functions to pumped storage protection?
  - o Potential question bullets: Why did you upgrade?
    - o Increased range
    - o Better sensitivity
    - o Problems obtaining renewal parts
    - o Enhanced protection
    - o Inappropriate operations
    - o Extend maintenance intervals
    - o Lack of monitoring
    - o Diagnostics
    - o Communications or enhanced communications
    - o Oscillography
- d. One company had difficulties with pumped storage protection schemes because the diff element was picked up when in pump mode and it wore-out differential relay.
- e. Pumped storage relays must have a good accuracy over a wide frequency range because pumped storage units must start at zero speed. Most micro processed relays are designed for 20~70 hertz. Below 20-hertz is not accurate. Plunger type EM relay is immune to lower frequency.
- f. Potential question wording: Regarding very low frequency operation (0-10Hz) what protection do you have during starting conditions?
- g. On figures, maybe we could give an example of what we want.

Contact Information:

US Army Corps of Engineers contacts:  
Joe Burden (Southeast area) office in maybe Columbia, SC

Doug Filer

Wayne Hartman will provide details on these contacts.

After meeting, Mike Thompson indicated that he has forwarded us the contacts associated with the units in the California area.

**J8: Generator Tutorial Revision**

**Chair: Michael Thompson**

**Vice Chair: Chris Ruckman**

**Established: 2007**

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

**Expected Completion: 2011**

**Status: final Phase I (document)**

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

The Working Group met for a single session with 15 members and 13 guests.

Chair offered thanks to the Working Group for their involvement in the tutorial effort. The tutorial has been approved and the final version posted on the PSRC Working Group's website. Chair is working on getting the tutorial posted on the PES website.

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

Chair noted that there is more material in new 260+ slides developed by the Working Group that can fit in a typical eight hour training session. Slides need to be reduced to around 200 slides to be practical.

Chair noted that the speaker notes for slides could still be improved to include all information that needs to be conveyed for each slide. The value of speaker notes was discussed and Chair asked that slide authors improve speaker notes as time allows. Any improvements submitted by the end of May would be helpful as they could be incorporated into the June tutorial presentation at the Pulp and Paper Industry Technology Conference.

Chair noted that, as a result of the tutorial effort, informational gaps were identified in various IEEE Guides. Chair proposed that the Working Group continue for one more session to compile a list of items that could be addressed in the upcoming revision of C37.102 and other Guides. The Working Group's assignment for the September meeting is to send Chair notes about tutorial chapters listing possible improvements to existing IEEE Guides.

J. Boyle noted that, when preparing for a training session, an effort needs to be made to avoid making modifications to the slides after they are submitted for printing. It was generally agreed that this was a good practice.

Chair commented that the tutorial will be available for download to everyone. The PowerPoint slides, however, will be available only to PSRC members.

For promoting the new Tutorial, chair noted possible presentation opportunity including the Texas A&M Relay conference and WPRC. It was noted that a short paper could be developed to promote the tutorial at conferences similar to the Georgia Tech Protective Relay Conference and

IEEE Section meetings. Chair will contact the planning committees for the various relay conferences to gauge interest.

J8 has been asked to make a presentation at the PSRC Main Committee meeting in Minneapolis, MN detail the contribution of the Working Group. The Chair will lead the presentation.

Chair asked for volunteers willing to present the tutorial at the Washington State Hands-on Relay School. C. Mozina tentatively committed.

K. Stephan suggested that a button be placed on the website next to the tutorial download that allows interested parties to contact the PSRC about having the tutorial presented at their event. The button would send an email to the current J subcommittee chair. Chair will contact Russ Paterson to see what is possible. At the J subcommittee meeting, Phil Waudby further suggested that a list of dates and locations where the tutorial will be presented be provided with the link.

The group discussed the tutorial's Copyright status and the possibility of selling hard copies of the tutorial for a nominal charge. Chair noted that the expectation today is to get a soft copy of the tutorial and that hard copies will be of limited interest.

It was asked if the tutorial would be locked so that comments could not be made to the document like most IEEE standards. Chair demonstrated the ability to annotate the document.

**J9: Motor Bus Transfer**

**Chair: Jon Gardell**

**Vice Chair: Dale Fredrickson**

**Established: 2006**

**Output: Working group report**

**Expected Completion: 2011**

**Status: Draft 4.0**

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

The working group did not meet this session. Draft 5, intended to be the final, is being compiled.

**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 5.0**

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

The meeting was attended with 10 members and 12 guests. After the introductions, the Patent Slides were shown. This was a double session.

The Atlanta meeting minutes were NOT approved as there was no quorum of members. The meeting minutes had been sent electronically previously. An email will be sent asking for electronic approval.

The chair has submitted to IEEE SA for a PAR extension for completion on December 2012.

Two carryover assignments from Atlanta Meeting were discussed by WG. A) Suhag Patel's assignment on discussion on RTD voting, this was decided to be included in document with removal of NEC reference sentence. B) Pat Kerrigan/Subhash Patel's assignment on

microprocessor relay methods on thermal modeling. It was decided to include in WG document. The above two will be included in the draft and chair will sent revised Draft 5.1 to WG members. With this all items that were decided to be included in the guide had been addressed and will be starting point for section-wise review. The various topics that have been included in this guide/along with section are shown in the last two sheets of this report.

Following are the assignments for section-wise review. The assignments are for proof-reading flow of material and technical accuracy. Suggestions for change will be tabulated to Chair/Vice Chair. All assignments are due by August 15<sup>th</sup>.

- 1) Prem will circulate a copy of the draft 6.0 which will include the above two Atlanta assignments to draft D5 that was circulated earlier. Guest members Phil Waudby, Nicholas Hoch, Everett Fennel and Jeff Long will be added to distribution.
- 2) Prem/Dale Finney will cleanup WG membership to trim membership to only members who have actually participated.
- 3) Chris Ruckman will check References and Bibliography.
- 4) Steve Conrad will review section 3 on definitions.
- 5) Hasain Ashrafi will review section 4 on Equipment description.
- 6) Motor Protection Requirements section 5.1 to 5.5 will be reviewed by Sudhir Thakur. He will add small introduction to section 5.0 during review.
- 7) Motor Protection Requirements section 5.6 to 5.10 will be reviewed by Patrick Kerrigan.
- 8) Motor Protection Specifications section 6.1 to 6.3 will be reviewed by Tom Farr.
- 9) Motor Protection Specification section 6.4 to 6.5 will be reviewed by Phil Waudby
- 10) Setting and Adjustments section 7 will be reviewed by Mohammed Khalek
- 11) Device 11, section 8 will be reviewed by Nick Hoch
- 12) Annex A2 on thermal modeling will be reviewed by Nick Hoch
- 13) Annex A3 Example will be reviewed by Dale Finney.
- 14) Wayne Hartman will modify section 7.4 to add bases for timer for under voltage setting. Chris Ruckman/Tom Farr will be reviewers. The time should allow the start of other high inertia motor and longer than system transients. This section was being reviewed based on review of NERC document in J3 by Mohamed Abdul Khalek.
- 15) Mike Reichard will review for any impact to C37.96 based on Aurora phenomenon. Prem would follow up with Murthy Yalla for a copy of IEC report on "thermal modeling" to review for any impact to C37.96

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

**Chair: Mike Reichard**

**Established: 2010**

**Output: Report to Subcommittee**

**Expected Completion: 2011**

**Status: Third Meeting**

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

The task force met on Wednesday, May 18, 2011 with 6 members and 38 guests.

Kevin Stephan chaired the meeting for Mike Reichard. The chair gave a very brief review of the purpose of the Aurora alert issued by the ES-ISAC through NERC.

The January 2011 (Atlanta Meeting) proposed paper/report subject of "Exploring Mitigation Measures..." with no reference to "Aurora" was reiterated. Attendees at this meeting still agree with this concept.

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



Chuck Mozina asked Juergen Holbach to report on a paper presented at Georgia Tech on the reliability of the presently available Hardware Mitigation Devices (HMDs). Wayne Hartmann explained synchronizing and closing controls typically found on dispersed generators. Gene Henneberg commented on sync and closing tests done in his Company. There was much discussion on identifying the problem before offering up solutions. Further discussion steered the report/paper toward a new title, "Protection Against Unwanted (Uncontrolled) Closing as it Affects Machines".

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) Don the machines lockout on load rejection (tripping)?
  - 9) DG/generator control systems

**Other Reports:**

C17: Fault current contribution from wind farm plants

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

**Liaison Reports**

**Electric Machinery Committee (EMC)**

**C. J. Mozina**

Nothing to report.

**IAS I&CPS Committee**

**C. J. Mozina**

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

**Nuclear 1E WG**

**P. Kumar**

This working group is looking at degraded voltage setpoints as applied to nuclear plants

**NERC**

**J. Uchiyama**

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

[Providing] inputs to Drafting Team dealing with the latest Draft of PRC-001-2 (System Protection Coordination) not including UFLS, UVLS, Loadability, Power Swings & Misoperation). One of the

issues was Fault Pressure and Sudden Pressure Relays. Are they reportable items, or not?  
Answer: They are not reportable since the definition does not include [them].

Other Items:

- a. White paper on Protective Relays to Power Swings
- b. Remote Backup protection technical reference document
- c. Reliability metric WG supports
- d. Generator Control Coordination technical reference document
- e. PRC Standards under development.-
  - PR-001-2 (Generator & Transmission protection coordination)
  - PRC-005 (Protection system maintenance & Testing)
  - PRC-023-2 (Line relay Loadability)
  - Project 2010-13 (Generator Relay Loadability)
- f. Special Protection Review – SPS (RAS)
- g. Breaker Failure Design Issues

Next Meeting: June 28-30, 2011 at San Francisco

### **Coordination Reports**

None

### **Old Business**

The Excitation subcommittee of the PSDPC expressed an interest during the special meeting in Atlanta in January to meet with members of J SC informally during the Detroit PES meeting in July. Chair asked for who from J is planning to attend the PES meeting.

A new task force/working group was suggested in January on Out-of-Step relaying for generators. This interest still exists this meeting so Working Group J5—Application of Out-of-Step Protection Schemes for AC Generators has been initiated with chair, assignment, and approvals pending.

The reaffirmation for C37.101 Guide for Generator Ground Protection has been initiated. The reaffirmation for C37.102 Guide for AC Generator protection will be started later this year as well.

### **New Business**

Tom Farr of Eaton Corporation has joined the Subcommittee—welcome Tom.

### **K: SUBSTATION PROTECTION SUBCOMMITTEE**

**Chair: P.G. Mysore**

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

The K-Subcommittee met on Thursday, May 19, 2011 in Asheville, NC, with 20 members and 26 guests in attendance. A quorum was achieved to approve the minutes of the January 2011 subcommittee meeting.

Three new members joined the K subcommittee: Lubomir Sevov, Roger Whittaker, and Adi Mulawarman.

There is a concern of not achieving quorums at working groups and subcommittee meetings in the past year. As per the directive of the PSRC officers, seven members who had not attended the K subcommittee meeting in over a year and/or who are known to have retired were removed from the K subcommittee roster: B. Anderson, M. Begovic, G. Benmouyal, J. Burger, S. Chano, B. Gordan,

and F. Plumptre. The chair will be writing e-mails to each of these members thanking them for their contributions in the past.

The committee membership presently stands at 30 members.

The following Task Forces were elevated to Working Groups starting at the September 2011 Meeting: KTF1 has become WG K1. KTF5 has become WG K5.

#### **ITEMS OF INTEREST FROM THE ADVISORY COMMITTEE MEETING:**

None

#### **Reports from the WG Chairs**

##### **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: 2011.**

**Output: Papers – 1. Full Paper Report to the Sub Committee and Main Committee, and 2. Summary Transactions Paper Draft 1; 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 May 18, 2011 with 8 members and 5 guests

Introductions were done and previous minutes were discussed.

We began reviewing draft-1 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.

Added two new members and one corresponding member.

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

**Chairman: Chuck Mozina (sitting in for Mukesh Nagpal)**

**Vice Chair: Jeff Barsch (sitting in for Chuck Mozina)**

**Established: 2008**

**Output: Guide Revision**

**Draft 5**

**Expected Completion Date: 2012**

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

The working group met on Tuesday, May 17, with 11 members and 9 guests present. A quorum was not present.

After introductions, the chairman presented the minutes from the January, 2011 meeting. There were no changes suggested by the members in attendance. The chairman will request approval of the January 2011 meeting minutes via email because there was no quorum present.

The IEEE Patent slides were shown.

Review progress on passed assignments:

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

Co-generation, Standby generation and IPP were added to the definition section.

Section 5.2.1 Capacitor Tripping – Assigned to Mike Jenson

The WG suggested that a sentence be added that DC tripping is preferred and a short statement as to why.

4.1 Drawings 1-9 – Assigned to Steve Turner.

Briefly review by WG. It was decided to remove secondary fuses and just show breakers in one-line diagrams. Also added a sentence to text under Drawing 1 to caution on fusing transformer where secondary ground current is limited by a grounding resistor.

5.2.2 CT and VT for Protection – Assigned to Ken Behrendt

The WG reviewed the write up and approved it without change.

Review of new material in Section 7:

Review of Section 7 – Customers with generation. – Assigned to Frank Plumptre, Mukesh Nagpal and reviewed by Dean Miller

The majority of the session was devoted to review the new material in Section 7, especially the application of reverse power relays (32) to detect loss of supply. Drawing need to be provided in Section 8 (Interconnection Examples) that reflect the changes in Section 7 especially relating to the use of the 32 relay. The sensitivity of digital 32 relay to detect transformer magnetizing was questioned by the relay manufactures present. Chuck Mozina will take the lead in developing protection one-line diagrams that reflect these changes discussed. Other minor text changes in the write-up of the application of the 32 relay were identified and those changes were made in the draft document.

All outstanding as well as new assignments are due to the chairman by June 30.

Wayne Hartmann resigned from the Working Group.

At the Fall PSRC meeting in Minneapolis the chairmen of the IAS dot standard on consumer/utility interconnection will join our WG meeting.

**K6: SUDDEN PRESSURE PROTECTION FOR TRANSFORMERS**

**Chair: Randy Crellin**

**Vice Chair: Don Lukach**

**Established: May 2005**

**Output: Report**

**Expected Completion Date: January 2011**

**Draft 4.0**

**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 Wednesday afternoon, May 18th, in a single session with 5 members and 7 guests. The working group currently has 18 members.

After introductions and a brief review of the working group progress, we discussed the revised sudden pressure relaying survey summary document. After the January meeting a smaller group of volunteers (Gene Henneberg, Greg Sessler, Don Lukach, and Randy Crellin) worked on identifying ways to better interpret the data and provide editorial comments to help the reader better

understand the responses. Gene Henneberg did a great job of analyzing the data and developing summary graphs for the document. We are currently working on Draft 4 of the document.

Phil Tatro from NERC attended the working group meeting and provided some of his thoughts regarding future NERC standards (like PRC-005 the Transmission and Generation Protection System Maintenance and Testing Standard) and how these standards might apply to the use of sudden pressure relays.

The working group members were asked to review the latest draft of the technical document for content and to provide comments and/or suggestions for additional writing assignments. These comments are due by June 15th and will be discussed along with the final survey report during our next meeting in Minneapolis.

**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 5.2**

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

The Working group, K8, met on May17, 2011 in 1 session with 10 members and 10 guests in attendance. After the introductions, IEEE Patent slides regarding the patent policy were shown. January 2011 Meeting minutes was approved via e-mail.

The discussions were mostly on the clause 6.1 -Peninsula and Single point grounding and the recently published IEEE transactions paper. After the discussions and taking input of several members who commented on this earlier, the decision was to curtail the explanation on the grounding and reference the application guide 1036, approved for publication in December of 2011 and is now available. Iliia will incorporate the changes in the next draft.

The chair informed the attendees that he would proceed with moving forward to send invitation out to ballot the draft in IEEE after approval from the PSRC officers at the main committee meeting. Iliia will incorporate the changes suggested by members who reviewed the draft 5.0 sent out before the May meeting.

Since the PAR expires at the end of this year, the chair will work with Phil Winston and IEEE to apply for extension of Par by another year.

The existing draft is being reviewed and updated by Ms. Soo Kim of IEEE to make this ballot ready.

The chair informed that John Harder's paper on protection of CTs has been added to PSRC website and the paper reference will direct readers to PSRC website. This was done as efforts to get this published on an IEEE publications site did not work.

**K10: SCC21 DISTRIBUTED RESOURCES STANDARD COORDINATION**

**Chair: Gerald Johnson**

**Vice Chair: TBA**

**Established, 1999**

**Output: Standard through the SCC 21**

**Expected Completion Date: 20xx**

**Assignment:** To interface with SCC21/P1547 in order to reduce unnecessary delays by getting PSRC input into the process without having to wait for after-the-fact coordination.

K10--SCC21 Distributed Resources Standard Coordination working group met on May 17, 2011 with 7-members and 5-guests. Status of the active working groups in the 1547 series were reviewed as follows:

IEEE-1547.1-2005 "Standard Conformance Test Procedures for Interconnecting Distributed Energy Resources with Electric Power Systems" James Daley, Chair; Ben Kroposki, Secretary, was reaffirmed.

P1547.4 "Draft Guide for Design, Operation and Integration of Distributed Resource Island Systems with Electric Power Systems", was balloted in 2010 and was "affirmed". Comments have been resolved and has been recirculated for ballot.

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" was balloted in 2010 and "affirmed". Comments have been resolved and document is about to re-circulate.

IEEE P1547.7 "Draft Guide to Conducting Distribution Impact Studies for Distributed Resource Interconnection", draft 4.2, was posted on 2-11. Plan is to ballot at some point this 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 Feb 2011. Dave Bassett of PPL is the chairman of this group. He has relay experience and many years of dealing with IPP and DG on the PPL system. I have joined a writing group that is focused on Developing DR and Utility Protection Best Practices for IEEE 1547.8 April 14, 2011. Outline of the working group is as follows:

Outline for P1547.8 Draft Recommended Practice for Establishing Methods and Procedures that Provide Supplemental Support for Implementation Strategies For Expanded Use of IEEE Standard 1547

The following writing group (WRTG) schedule was developed at 2011 02-11 working group meeting. The writing group inputs including the revised members list should be submitted in MS Word (track changes where legible) by the writing group leaders to: Tom Basso at Thomas.basso@nrel.gov and Paul Sheaffer at sheaffer@rdcnet.com and David Bassett at dlbassett@pplweb.com

| <u>Date</u>                   | <u>Action</u>  |
|-------------------------------|--|
| • February 14- April 15, 2011 | Writing groups (WRTG) revise respective WGRD sections and members list |
| • April 15, 2011              | WRTG Leaders submit revised inputs                                     |
| • April 15- June 1, 2011      | WGRD restructured to new outline (by officers)                         |

- June 1, 2011 WGRD version 2 posted
- July 1, 2011 Comments due on WGRD version 2
- July 15, 2011 Post compiled comments
- August 4-5, 2011 (tentative) Work Group meeting

*Respectfully submitted by* Thomas Basso and Dave Bassett, co-chairs of P1547.8.

**Writing Groups (WRTG; 20110211; the \* indicates the WRTG Leader)**

**4.1.1 Voltage Regulation**

N. Markushevich\*; G. Olson; Z. Morton; P. Evans; B. Escott; T. Rzy; J. Lemke; R. Walling; J. Smith; K. Sheldon; S. Gonzalez; J. Romero; M. Scharf; M. Mills-Price

**4.1.6 Monitoring**

F. Cleveland\*; D. Pearce; J. Kueck; A. Hefner; K. Collins; R. Seitz; M. Scharf; B. Seal; M. Stelts; C. Herig; J. Reilly

**4.2 Response to Area EPS abnormal conditions**

T. McDermott\*; R. Bravo; J. Kueck; R. Walling; K. Collins; M. Coddington; C. Vartanian; D. Nichols; D. Beach; K. Schoder; E. Sexton; W. Stec; N. Markushevich; C. Herig; Z. Morton; Y. Xu; T. Zgonena; K. Harley; M. MillsPrice; R. Hudson

**4.3 Power Quality**

B. Saint\*; J. Koepfinger; J. Cleary; R. Boudreau; C. Vartanian

**10 Coordination of P1547.8 with NEC and UL 1741**

R. Seitz\*; T. Zgonena; B. Baczeanas; T. Conrad; G. Olsen; M. Coddington; A. Hefner; M. Stelts; B. Escott

**10.1 Additional data**

A. Sexton\*; R. Bravo; R. Rietz; C. Schauder; T. McDermott; J. Hambrick; J. Enslin; S. Sivakumar; R. Walling; O. Faruque

**10.2 DR facilities 10 MW to 20 MW connected to Area EPS distribution**

P. Sheaffer\*; M. Sheehan; J. Gajda; G. Olsen; R. Bravo; Tassoc Golnas

**10.3 Optimizing group behavior of multiple DRs; system optimization**

C. Komomua\*; D. Pearce; N. Markushevich; C. Clarke; P. Evans; R. Rietz; R. Boudreau; R. Bravo; T. Golnas; B. Steeley; M. Sakuma

**10.4 DR/area EPS faults; clarification of best practices**

D. Williston\*; M. Sheehan; R. Neal

This is the working group I am on and will supply the latest draft as soon as it is available.

The next P1547.x working group meetings will be in August 2011 in San Francisco. If you have special interest in the progress of a particular SCC21 working group or would like to provide input, let me know and I will make sure the information gets to the right place.

**KTF1: INVESTIGATE UPDATE OF PSRC REPORT, "PROTECTION OF PHASE ANGLE REGULATING TRANSFORMERS" DATED OCTOBER 21, 1999**

**Chair: Arvind Chaudhary**

**Vice Chair: Lubomir Sevov**

**Established: Sept. 2010**

**Output: Recommendation to K subcommittee on whether to form a working group**

**Expected Completion Date: TBA**

**Assignment:** Write a guide for the application of Protective Relaying for Phase Shifting Transformers (PST). The protection methods for different types of PST and operating conditions of PST 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 task force met with 18 attendees total. Attendees included 14 potential WG members and 4 guests present.

Charlie Henville pointed out that a Task Force can only meet twice before being approved by the K subcommittee. Therefore it was brought up that we should submit a PAR before September.

Michael Thompson brought up that C57.135 "Guide for the Application, Specification and Testing of Phase Shifting Transformers" has a brief discussion on protection of PSTs, which may be out of scope for the Guide, but since the balloting has passed, it is unavoidable now.

Arvind Chaudhary took the action item to seek IEEE approval to release C57.135 to the members of the working group.

Charlie brought up that there are two action items for this meeting:

- Define the scope of the PAR
- Define assignments for the working group.

Charlie suggested the title "Guide for the Application of Protective Relaying for Phase Shifting Transformers"

The task force then broke into detailed discussion of the assignment, which was edited by the group.

- Dean Miller brought up the question of whether we should discuss controls of PST in the Guide. Mike said that discussing the PST controls would be outside the scope, unless it affects the protection.

- Bogdan Kasztenny pointed out that if using terminology "operating" instead of "control", will cause less controversy in the Guide.

- Dean pointed out that the PST designs are different, and this is what will drive applying different protection, therefore this will be included in the guide.

- It was brought up that examples of the protection settings should be included into the guide.

- Bogdan brought up the point on Short Circuit modeling and the difficulties in quantifying the big number of internal fault cases depending on the differences of PSTs and the bushing to bushing modeling. He suggested that these internal fault cases are difficult to obtain, and hence would be difficult to include in the Guide. The group concluded that we would take a shot at developing the short circuit model for PST's but would leave it vague.

- The group discussed whether CT sizing should be discussed in the Guide, and it was decided to leave this in the assignment.

- It was brought up that modern vs. electromechanical relaying of the PSTs is not legitimate discussion for the guide, but rather the guide should discuss protection principles, theory and practices, and not specific apparatus.

The group then developed the scope for the PAR listed above which has subsequently been submitted to the K subcommittee Chair.

Charlie suggested that the subcommittee appoint a chair, and then the PAR form is filled out offline. The task force defined the scope for the PAR: "IEEE Guide for Application of Protective Relaying for Phase Shifting Transformers"

"The protection methods for different types of PST and operating conditions of PST 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."

Bogdan gave an overview of CIGRE WG on Protection of PSTs which held its first meeting at Vasteras, Sweden.



- The CIGRE group has a detailed table of contents including the PST and the other specialty transformers – Scott and LeBlanc transformers, and pulse transformers supplying power electronics.
- They should finish in 2 year time.
- They meet once or twice a year.

**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**

**Assignment:** To review re-affirmation comments and recommend whether to update C37.119-2005 – IEEE Guide for Breaker Failure Protection of Power Circuit Breakers.

The task force K5 met at 08:00 am on Wednesday, May 18th 2011 in Asheville, NC in a single session. Among the 10 attendees 8 become members.

The chair explained the status of the guide. The guide went through reaffirmation and got approved but received some editorial comments and suggestion of new topics to cover.

We discussed a few of the comments received and decided to start a Working Group to ask members to further response and update the guide.

We worked and agreed on the assignment for the working group to be created To revise and update C37.119-2005 – IEEE Guide for Breaker Failure Protection of Power Circuit Breakers. : .

Plan for next meeting:

- A presentation at the next meeting from one member (Roger Hedding) on what is covered in the current guide.
- The chair and vice chair will prepare a draft for scope and purpose for PAR Submittal at September 2011 meeting. We plan to wait until September 2011 to do assignment. Between September 2011 meeting and end of year 2011 we plan to submit the PAR.

**Liaison Reports:**

None

**Old Business:**

There was no old business discussed.

**New Business:**

The C subcommittee is starting a new task force to address a guide or standard for interconnection of IPPs to the utility grid. There was a brief discussion of how this effort fits in with the K4 and J3 working group assignments.

The chair and the vice chair welcome Adi Mulawarman, Lubomir Sevov and Roger Wittaker as the new members of the K- subcommittee.

**VII. PRESENTATIONS:**

Our presentations at this meeting:

**Bryan Gwynn: I3 Working Group Report - Functional Protection Scheme Testing Guide**

**EPRI:**

**Paul Myrda: Introduction and overview of EPRI's role and mission  
EPRI TI initiative  
Grid Transformation including new protection approaches  
Update on EPRI Smart Grid Substation Labs  
Impact of renewable integration on P&C  
Short-circuit modeling and system protection**

**Yuchen Lu: P&C Task Force at EPRI  
Ongoing P&C research projects and workshops**

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