IEEE/PES Transformers Committee

Meeting Minutes
November 10, 1999

IEEE/PES TRANSFORMERS COMMITTEE MEETING

November 10, 1999

Monterrey, Mexico

IEEE/PES TRANSFORMERS COMMITTEE MEETING

MONTERREY, MEXICO

NOVEMBER 10, 1999

ATTENDANCE SUMMARY

MEMBERS PRESENT

Aho, David	Anderson, Greg	Arnold, Jr. Jim	Artega, Javier
Ayers, Don	Barker, Ron	Barnard, Dave	Binder, Jr., Wally
Boettger, Bill	Borst, John	Chiu, Bill	Corkran, Jerry
Crouse, John	De La Houssaye, Kevin	Diamantis, Tom	Dix, Larry
Dohnal, Dieter	Dudley, Richard	Elliot, Fred	Ellis, Keith
Fallon, Don	Foldi, Joe	Galloway, Dudley	Ghafourian, Ali
Graham, Richard	Grunert, Bob	Gryszkiewicz, Frank	Haas, Michael
Hager, Jr., Red	Hanique, Ernst	Hanus, Ken	Harlow, Jim
Hartgrove, Bob	Hayes, Roger	Henning, Bill	Highton, Keith
Hopkinson, Phil	Iman, Mike	James, Rowland	Johnson, Jr., Chuck
Jonnatti, Tony	Juhlin, Lars-Erik	Kelly, Joe	Khalin, Vladimir
Kline, Don	Lackey, John	Lau, Mike	Lewis, Tim
Lindgren, Stan	Lowe, Don	Lundquist, Tom	Marek, Rick
Matthews, John	McShane, Patrick	McTaggart, Ross	Mehta, Sam
Miller, Kent	Mitelman, Mike	Molden, Arthur	Morehart, Gene
Mulkey, Daniel	Niemann, Carl	Orehek, Paul	Papp, Klaus
Patel, Bipin	Patterson, Jr., Wes	Patton, Jesse	Payne, Paulette
Perco, Dan	Pierce, Lin	Plaster, Leon	Platts, Don
Poulin, Bertrand	Preininger, Gustav	Prevost, Tom	Puri, Jeewan
Purohit, Dilip	Riffon, Pierre	Risse, Peter	Sampat, Mahesh
Shenoy, Vic	Shertukde, Hemchan	Sim, Jin	Singh, Prit
Smith, Ed	Smith, Jim	Stahara, Ron	Stoner, Ron
Sullivan, John	Trummer, Edgar	Wagenaar, Loren	Watson, Joe
Wilks, Alan	Zhao, Peter		

MEMBERS ABSENT

Allan, Dennis	Allustiarti, Raymond	Altman, Mike	Anderson, Glenn
Aubin, Jacques	Balma, Peter	Bancroft, Roy	Barnes, Mike
Bertolini, Edward	Bishop, Jerry	Brucker, Dave	Cambre, Jr., Max
Cash, Don	Chu, Don	Clark, Tom	Crofts, Dan
Dahinden, Vincez	Davis, John	Degeneff, Bob	Ebert, John
Feghali, Pierre	Fleeman, Jeff	Franchek, Mike	Frank, Jerry P.E.
Gayton, Carlos	Gillies, Jim	Girgis, Ramsis	Grubb, Bob
Hall, Geoff	Hansen, Wayne	Harlow, Jim	Heinrichs, Frank
Hoefler, Pete	Holdway, Tim	Hunt, John	Jhonsa, VJ
Jordan, Ron	Kallaur, Gene	Kennedy, Sheldon	Kennedy, Bill
Lazar, John	Lewis, Frank	Light, Hal	Loveless, Mark
Lowdermilk, Larry	Lowe, Richard	Ma, Joe	Maguire, Willliam
Massouda, Tito	McQuin, Nigel	Moore, Harold	Murray, Chuck
Musil, R.J.	Norton, Ed	Paiva, Gerry	Pekarek, Tom
Perkins, Mark	Raymond, Charlie	Rizvi, Alsam	Robbins, Chris
Robinson, Butch	Rossetti, John	Rowe, Jerry	Ruevekamp, Henk
Sankar, V.S.N	Savio, Leo	Saxon, Bill	Scheu, Bob
Sharma, Devki	Skinger, Ken	Smith, Jerry	Smith, Steve

Stein, Werner
Stiegemeier, Craig
Sundin, David
Templeton, Jim
Thenappan, Vis
Thompson, James
Traub, Tom
Tuli, Subhash
Vaillancourt, Georges
Veitch, Bob
Ward, Berry
Weffer, Felipe
Whearty, Bob
Wimmer, Bill
Woodcock, David
Young, Rick

GUESTS PRESENT

Ahrens, Paul
Antweiler, Jim
Arpino, Carlo
Banjoya, Nagatoshi
Bartley, Bill
Beaster, Barry
Betancourt, Enrique
Bosiger, John
Bray, Frank
Cancino, Alvero
Castellanos, Juan
Coffman, Lindsay
Colopy, Craig
Cooper, Ron
Darwin, Alan
Daubert, Ron
Delgado, A.M
Diaz, Rafael
Eckholz, Klaus
Fausch, Reto
Forrest, George
Foster, Derek
Fyvie, Jim
Garcia, Ramon
Garza, Joseph
Gianakouros, Harry
Greely, Thomas
Griesacker, Bill
Gruber, Myron
Guerrero, Sergio
Haggerty, Kent, P.E.
Harley, Jack
Henry III, George
Holland, J.
Horning, Mike
Huff, Tim
Hughes, Bert
Humenick, Noelle
Ipser, Mike
Jaroszewski, Marion
Jauch, Tom
Kalra, C.J.
Keithly, Dave
Kirchner, Lawrence
Klaponski, Brian
Kranich, Neil
Krause, George
Ladroga, Rick
Leuenberger, Boyd
Lopez, Filiberto
Lopez, Jose
Machado, Jr., Tamyre
MacMillan, Donald
Marlow, Dennis
Martinez, George
McNelly, Susan
Michael, Ferstl
Milward, Paul
Moffat, Jock
Morales Cruz, Emilio
Molton, Mark
Nguyen, Van Nhi
Nielsen, Jim
Nordman, Russ
Oommen, TV
Oriti, Samuel
Patel, Sanjay
Payerle, George
Perri, Frank
Pisila, Eric
Progar, John
Reiss, Tony
Reitter, George
Riboud, Jean-Christophe
Rivers, Mark
Sarkar, Subhas
Schwartz, Wes
Schweiger, Ewald
Simpson, Jr., Bill
Smith, Bill
Snyder, Steven
Somma, Joseph
Sparling, Brian
Steineman, Andy
Steuestam, Bengl-Olof
Subramanian, Raman
Swinderman, Craig
Traut, Al
Tuohy, John
Villasenior, Alejandro
Weidmann, Klaus
Wicks, Roger
Ziomek, Waldemar

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IEEE PES TRANSFORMERS COMMITTEE MEETING
WEDNESDAY, NOVEMBER 10, 1999
Chair: J. W. Matthews Vice Chair: B. K. Patel
Secretary: H. J. Sim

1.0 Chair's Report - J. W. Matthews

The chair J. W. Matthews called the meeting to order at 8:00 A.M. Mr. Matthews opened the meeting by complimenting Alfonso Delgado for the excellent meeting. The Committee thanked the Host Committee with a round of applause.

Alfonso reported on the attendance and other statistics (see Clause 4.0).

Alan Wilks provided details about the next meeting in Nashville, TN on April 1 - 5, 2000. See Clause 4.0 for the details.

Mr. Matthews highlighted the discussions held during the Administrative Subcommittee on November 7, 1999. See the Administrative Subcommittee Meeting Minutes in Clause 4.0 for details.

1.1 Report on the Technical Council Meeting, July 20, 1999 in Edmonton, Alberta, Canada

Attendance for the Summer Meeting stood at approximately 1350 at the time of the Technical Council Meeting.

1.1.1 Management of Standards Production

Chair Jones held a discussion on a topic that has become "very high profile" within the governing board – Management of Standards Production. He stated that we need to improve in the time to produce standards from PAR approval to Standards Board action. One of the complaints received from the industry advisory council is the length of time to complete standards. Perception at the Standards Board level that PES takes forever to get standards out the door is causing PES to lose some standards. The perception also exists that Standards Coordinating Committees can complete standards in two years. The discussion continued with a review of the history behind the combination of SCC-21 and SCC-23. Combination included the increase in scope to include distributed generation. PES is not fast enough in recognizing and addressing new issues. Standards Coordinating Committee of the Technical Council has been charged with the management of the standards development process. Each of the Working Groups are to develop a Gantt Chart showing the schedule and current status for each standard that is currently under development. Comments and questions were received from Rick Hartlein, Judy Gorman, Don Russell, Bal Gupta, and John Posey.

Jones issued a challenge in two parts –

- PAR extensions are unacceptable for just not getting the job done. A schedule should be developed for each standard project and working group chairs may be replaced for non-performance.
- Each Technical Committee is to pick one standard to expedite and strive to achieve approval in less than two to two and one half years. Report the selection back to Jones.

Several comments were received from Don Russell, Don Volzka, Gary Engmann, Bal Gupta, and Gerald Lee.

Jones asked Jim Gurney, Gary Engmann, and John Posey to review the history of what happened and if there was a violation of the Standards Board By-laws or rules regarding SCC-21.

Judy Gorman reported that presentation materials are available for working group chairs on how to run successful working group sessions.

1.1.2 Special Publication

President Don Russell announced a special publication to be issued in the second quarter of the Year 2000. This publication will include the "best" PES or AIEE papers of the last one hundred years that have had a major impact on the profession. Nominations are requested within sixty days (during September) with supporting documentation to Don Russell.

1.1.3 Future Meetings

Winter 2000 - Singapore

Don Volzka reported that 600+ proceedings papers have been received for review to be included in the Winter 2000 meeting program. The advanced registration fee will be required of each author before their papers are accepted.

He also reported that airline tickets have not been issued by the "official travel agency" of the Winter Meeting in order to allow changes to be made at the latest date without a penalty.

Chair Jones requested that each Technical Committee include in their written report to the Technical Council the level of participation that they expect at the Winter Meeting. This should include panel sessions, paper sessions, and committee meetings.

Summer 2000 – Seattle

Anjan Bose was announced as the Technical Program Chair for the meeting. He then described his preliminary plans for the meeting.

Chair Jones reiterated that a written summary presentation must be provided by each panel member. If the presentation is not in hand at the time the program is printed, the presentation will not be included in the program. This summary should be provided to the TCPC.

1.1.4 Electronic Paper Submission

Mel Olken reported on the status of electronic publishing. The IEEE is going into electronic publishing in the Year 2000, PES will be on-board for that effort. Electronic review prior to publishing is a natural fit. IEEE is behind on their web-based review. PES will use an interim e-mail based system. This system will use a data base called Flight Deck which is currently in place. The planned IEEE paper format will use many attached files. PES will follow this cumbersome method. Many comments followed. Submittal of all transaction papers will be required very shortly.

Electronic letterhead logos and previous letterheads in a PageMaker format can be obtained from Carrie Briggs.

1.1.5 IEEE-SA Strategic Initiatives

Judy Gorman gave a presentation on IEEE-SA Strategic Initiatives. The initiatives include globalization and outreach to the societies. Internationalization is a better word for the direction

of the IEEE-SA. Multiple strategies will be utilized. Judy described each of these strategies in detail and related some of the successes.

1.1.6 Technical Council Organization

Don Volzka reported on the direction of the organization of the Technical Council. He briefly described the draft report of the Task Force headed by Stig Nilsson to provide recommendations for organizational changes. The report is to be finalized by mid September and presented to the Technical Council for review.

1.1.7 PES Directory

Jim Harlow described last year's method of providing information to the Secretary for the purpose of updating the PES Organization and Committee Directory. This was to provide the information that Jim had for each committee back to the committees by mid August with a deadline of October 1 to receive the updated information. Officer changes will be accepted up to November 15. This method will be utilized again this year. Bruce Dietzman will receive the information this year.

Additional details will be provided on these items, if requested.

1.2 Topics from Committee Chairs

There were no topics for discussion from the Technical Committee Chairs

1.3 Standing Committee Reports

1.3.1 Future Technical Development Committee - Tom Pinkham

The meeting was held as noted with 10 members and guests present.

Harry Jones, Chair of Technical Council, discussed in detail the concerns of the Governing Board that PES is not being aggressive enough to identify and act on significant New Technologies in the Power Engineering area, particularly in developing appropriate Standards in a timely (rapid) way. He asked this Committee to spearhead efforts toward this end. After a lengthy discussion it was agreed that the Committee clearly should be in a position to spearhead this effort, it must structure itself to initiate action on areas identified. Topics presented at Sessions sponsored by the Committee are a potential source.

The Session on "Emerging Technologies in the Power Industry", arranged and chaired by Brian Gott was discussed briefly. It was an excellent Session, unfortunately scheduled for Thursday. (Note: the Session had approximately 20 attendees most of who attended the entire Session and asked a number of good questions.)

Dr. Gott will arrange a similar Session for the 2000 WPM in Singapore and we plan to sponsor another such Session for the 2000 SPM in Seattle.

1.4 Transformers Committee Report to Technical Council

I reported the following to Technical Council for the Committee:

1.4.1 Committee Meeting Activities

Our Spring 1999 meeting was held April 12-15, 1999 in New Orleans, LA in conjunction with the IEEE T&D Conference. Mr. Rowland James, Entergy, was our host. A total of 262 members and guests attended the meeting. It should be noted that although we had good attendance, many Committee members experienced conflicts between attending our meetings and additional

responsibilities associated with the T&D Conference. We will not schedule our Committee meetings concurrent with future T&D Conferences.

Membership of the Transformers Committee currently stands at 170 members and 20 Emeritus members. The regular members consist of 80 producers, 50 users, and 40 general interest. Our invitation list consists of over 500 engineers and managers in the transformer and utility industry. Attendance at our semi-annual meetings is typically near 300. Anyone with an interest in furthering the technology is welcome at our meetings. With active participation, an invitation is extended to become a member.

The Committee goals are to encourage open participation in transnationalization of transformer standards; to promote technical and educational endeavors such as panel sessions, peer review of technical literature on cognizant subjects; and to support the efforts of the Power Engineering Society.

Future Meetings

Fall 1999:

November 7-10, 1999, Monterrey, Mexico. Contact Alfonso Delgado, host @ GE Prolec + (52)(8) 3860963, fax + (52)(8) 3861902 or one of the Committee Officers.

Spring 2000:

April 2-5, 2000, Opryland Hotel, Nashville, TN, USA. Contact Alan Wilks, host @ ERMCO Transformers + (901) 285-9121, fax + (901) 287-4101 or one of the Committee Officers.

Fall 2000:

October 15-18, 2000, Niagara Falls, Ontario, Canada. Contact Roger Hayes, host @ Ferranti-Packard Ltd. + (905) 685-6551, fax + (905) 685-9783 or one of the Committee Officers.

Spring 2001:

Amsterdam, The Netherlands. Contact Ernst Hanique, host @ Smit Transformers + (31) 024-3568744, fax + (31) 024-3568748 or one of the Committee Officers.

Fall 2001:

Orlando, FL, USA. Contact John Progar, co-host with Joe Watson, Florida Power & Light, @ Ohio Transformer (800) 591-2256, fax + (941) 722-2549 or one of the Committee Officers.

Spring 2002:

Vancouver, BC, Canada. Contact Mike Lau, host @ BC Hydro + (604) 528-3201, fax + (604) 528-3347 or one of the Committee Officers.

1.4.2 1999 Summer Power Meeting Technical Sessions

The Transformers Committee is sponsoring one presentation session during the Summer Power Meeting.

1.4.3 Transformer Standards and Coordination Activities

The Transformers Committee takes responsibility for development and revision of IEEE Standards that fall within it's scope. These Subcommittees currently have fifty Working Groups

and Task Forces preparing proposals for standards projects. Information on these standards and projects can be obtained by visiting our WWW homepage:

http://www.dsuper.net/~georgev/Transformers.html

Links to information on our future meeting sites and other information on Transformer Standards can also be found there.

Our WWW site will link you to the IEEE Standards Status Report that contains titles, abstracts, and names of contacts for each of the IEEE standards. This report is updated quarterly by the IEEE Standards Department. The status of transformer standards not listed in the IEEE quarterly report, either because they have been withdrawn, or they are not IEEE standards, are also included on the Transformers Committee Web site.

Transformers Committee officers and Administrative Subcommittee members are also members of the USNC Technical Advisory Group to TC-14 (Transformers and Reactors). We continue to have productive meetings of the TAG at each Committee meeting.

John W. Matthews, Chair

2.0 Approval of Minutes of November 11, 1998 - B.K. Patel

The minutes of the New Orleans meeting were approved as written.

2.1 Meeting Planning Working Group -- G.W. Anderson, WG Chair

The "Meetings Planning WG" holds an open meeting at each TC meeting (generally on Tuesday afternoon) to plan future meetings and assist future hosts by education and mixing of ideas & lessons-learned. The meeting is attended by at least the WG Chair, the present meeting host, future hosts, and hosts from past meetings. Others interested in hosting a future meeting are encouraged to attend.

The fifth meeting of the new Administrative Subcommittee Working Group -- "Meeting Planning" began at 2:00 p.m., Tuesday, November 9, 1999 in the Durango Room of the Crowne Plaza Hotel in Monterrey, N.L., Mexico. Twenty-four (24) individuals attended. Greg Anderson, WG Chair facilitated.

The meeting began with introductions by the attendees.

2.2 Meeting Finances

Before the previous meeting in New Orleans, the Committee's funds was $15,135.99. The New Orleans meeting had revenue of $12,868.32 and expenses of $15,384.10, resulting in a net income (loss) of ($2,515.78). Therefore, the Committee's funds before the Monterrey meeting was $12,620.21.

2.3 Past & Present Meetings

2.3.1 Past Meeting - New Orleans

Rowland James, gave a brief report of the previous meeting in New Orleans. This meeting was held during the IEEE T&D Conference. Due to events associated with the Conference, no social events or companions tours were held in association with the TC meeting. Rowland reported on the attendance at the meeting (see the Attachment at the end of minutes). It was noted that Rowland did a great job of arranging the Committee's meeting while assuming other duties for the IEEE T&D Conference.

The WG will continue to strive for continuity (similar appearance) of future meetings and therefore will avoid holding a future meeting at upcoming T&D Conferences.

2.3.2 Present Meeting - Monterrey, Mexico

Alfonso Delgado Cruz welcomed everyone to Monterrey and gave a brief report of the ongoing meeting. Alfonso reported on the attendance at the meeting (see the Attachment at the end of the minutes).

2.4 Future Meetings

2.4.1 Summary

The following dates, locations and respective hosts for future meetings were reviewed.

- April 2-5, 2000 -- Nashville, TN … Alan Wilks (ERMCO)
- October 15-18, 2000 -- Niagara Falls … Roger Hayes (VA-Tech/Ferranti-Packard)
- Spring, 2001 -- Amsterdam … Ernst Hanique (SMIT)
- Fall 2001 -- Orlando, Florida ... Joe Watson (FPC) and John Progar (Ohio Transformer)
- Spring 2002 -- Vancouver, B.C. … Mike Lau (BC Hydro)
- Fall 2002 -- open for US meeting; contact Greg Anderson for information
- Spring 2003 -- open for US meeting; contact Greg Anderson for information

2.4.2 Upcoming Meeting -- Nashville

Alan Wilks from ERMCO gave a report on the progress of the Spring 2000 meeting in Nashville. Alan has rooms reserved at the Opryland Hotel. He has also reserved seats for a Saturday evening show at the Grand Ole Opry. The Tuesday Evening Dinner Social will be on the Showboat General Jackson. Alan Wilks can be reached at (901) 285-9121 or awilks@ermco-eci.com.

2.4.3 Upcoming Meeting -- Niagara Falls

Roger Hayes has reserved two hotels at Niagara Falls (on the Canadian side) for the Fall 2000 meeting. The hotels are the Sheraton Fallsview and the Marriott Fallsview. All meetings will be held at the Sheraton. Roger Hayes can be reached at (905) 685-6551 or hayes.roger@vatech.fpt.ca.

2.5 New Business

2.5.1 TC Web-Page

The Committee's web-page has been enhanced to feature more information about upcoming meetings. In the future, when the invitation packages are mailed out, essentially all the information found in the invitation packages will be available on the web-page. A big thanks to Georges Vaillancourt for maintaining the site. The address for the TC web-page is: www.dsuper.net/~georgev/Transformers.html.

2.5.2 Meeting Schedule

In the past, each meeting host was required to create and manage the meeting schedule. In the future, Greg Anderson will perform this duty. Benefits will include: reducing each Host's

"learning curve"; improving the similar appearance of each meeting (one of Greg's personal goals); and designating one "point man" for schedule input from each SC Chair.

Due to the increasing problem to fit all activities into the present meeting schedule, the Administrative Subcommittee decided to extend the meeting to another day (24 hours). Because several hotel contracts for upcoming meeting have already been signed, the extended schedule will begin at the Orlando meeting. The meeting will begin Sunday night with the usual Hospitality Reception. Activity meetings will begin on Monday morning and will continue through Wednesday afternoon. The "main wrap-up" meeting will be Thursday morning from 8:00 am until noon. Greg will submit a proposed schedule to the Administrative Subcommittee by March 1, 2000.

The following criteria for the extended schedule will be submitted to Administrative Subcommittee for approval.

- Only one timeslot for each SC meeting.
- No more than two timeslots for each WG or TC activity.
- A target maximum of five (6 absolute maximum) meetings per timeslot.

Greg will draft the proposal and formally submit it to the Subcommittee.

2.5.3 Meeting Budget Estimate

Each meeting host is now required to develop and submit a preliminary budget estimate for their meeting. This budget shall be prepared one year in advance of each meeting. The budget will help determine if the registration fee is sufficient and will not significantly deplete the Committee's funds. The host of the "next meeting" shall submit the proposal to the Administrative Subcommittee six months in advance of their meeting. Greg will assist each host will developing the budget. Greg developed a sample budget (a template) and will send it to each upcoming host.

At this meeting in Monterrey, an additional discount of $10 was given for IEEE members.

2.5.4 "Concentration Banking"

In the past, each meeting host was required to open a non-interest-bearing account at a local bank and maintain the funds. After a host has "closed the books" of their meeting, the remaining funds were passed-on to the next host. The host then had to have checks printed, an endorsement stamp made, etc. This has proved to be a burdensome activity. IEEE Financial Services offers, a service called "concentration banking" where funds can be maintained in one location. Because IEEE will administrate the tax paperwork, the account can be interest-bearing. Checks can be sent to the upcoming host and the account can be monitored via a secure web-site. Greg has applied with IEEE to open a "concentration bank account".

2.5.5 On-line Registration

On-line registration was enable for the first time at this meeting. IEEE Travel & Conference Management Services provided a secure site where attendees could register for the meeting and events and pay for fees using a major credit card. Although there were some problems associated with transferring some data to the host team in Monterrey, the process was helpful in administrating meeting registration. For this meeting, approximately 220 (approx. 78%) of the attendees pre-registered using the on-line process.

2.6 Miscellaneous

Greg Anderson is now employed with Omaha Pubic Power District and can be reached at (402) 636-2561 or gwanderson@oppd.com.

2.7 Special Presentation -- IEEE TCMS

Ms. Michael Ellis, Manager of IEEE Travel & Conference Management Services (IEEE TCMS) gave a presentation of their available services. Some of the services include:

- Complete Travel Services
- Conference Registration
- Technical Program Coordination
- Site Selection, Contract Review & Negotiation
- Social Events & Menu Selection
- Meeting Database (mailing list & vital statistics)
- Tax Assistance
- Budgeting & Financial Coordination
- Grants Procurement Assistance

The Meetings Planning WG will continue to investigate how IEEE TCMS can further assist us.

The meeting was adjourned.

3.0 Vice Chair's Report - B.K.Patel

3.1 PES Technical Council Committees

The following are reports on activities of PES Committees on which the Vice Chair serves as Committee representative. All of the meetings reported were held at the 1999 Winter Power Meeting in Edmonton, Alberta, Canada on July 20-23, 1999.

3.1.1 Publications Committee

Paper submission dates for Winter and Summer meetings were agreed upon at the previous meeting and finalized as follows without change. This information is available from the PES website.

For Proceedings Papers:

Activity	Winter Meetings	Summer Meetings
Authors submit abstracts to PES Executive Office	Jul 1	Dec 1
Authors notified by PES Executive Office of conditional acceptance (or rejection) based on review of the abstract	Aug 15	Feb 1
Authors submit complete *Proceedings* papers to PES Executive Office	Oct 1	Mar 15
Authors notified of final acceptance or rejection based on review of the full paper	Nov 12	Apr 27

For Summary of Panel Presentations:

Activity	Winter Meetings	Summer Meetings
Summary of presentation (2 to 6 pages) submitted to Panel Session Chair	Sep 1	Mar 1
Panelists notified by Panel Session Chair of acceptance or required changes to the summary	Oct 1	Mar 15
Panelists submit revised summaries to Session Chair, if required	Nov 1	Apr 15
Panel Session Chairs submit complete session information to Technical Committee TCPC and PES Executive Office	Nov 12	Apr 27

In addition to the above, the list of sessions and committee meeting rooms must be submitted by the committee TCPCs to the PES Executive Office by September 15 (for Winter meetings) and by March 1 (for Summer meetings)

Mel Olken made a presentation regarding the status of electronic publishing. Electronic Transactions papers submission has begun as of June 1, 1999. Electronic submission for all papers is expected for the 2000 SPM in Seattle WA.

The technical committees are requested to submit a story on their committee activities to printing in the PE Review. The editorial content and the length of the article are at the discretion of the author. It may include such as: technical information, announcement of new working groups and task forces and membership information. It was reported that the Singapore meeting has received overwhelming number of requests for paper presentations. The majority of these are from the Pacific Rim.

The name of the Publications Committee no longer appears to be appropriate due to the change in the approval procedure of transactions. It will be suggested that the O&P Committee be combined with the Technical Sessions Improvement Committee and the resulting entity be called the Technical Sessions Committee. This change will be voted on as part of the O&P Manual revisions.

3.1.2 Organization and Procedures Committee

3.1.2.1 Technical Committee Activity Reports

No major discussion during the individual TC report.

3.1.2.2 Revision of the Technical Council Organization and Procedures Manual

The TC Organization and Procedures Manual is under revision. A revision draft is expected shortly. The Transforms Committee O&P Manual will be revised accordingly and presented for review prior to next meeting.

3.1.3 Technical Sessions Improvement Committee

Following items were discussed:

1. Some suitable means should be found to communicate to an author about the quality of his/her presentation. It was suggested that the session chair should let the author know how he can improve his presentation.
2. The need to provide LCD projects for oral sessions was discussed and it was suggested that they should be available from 2000 SPM in Seattle. Overhead projectors should still be provided as backup. The presenters should bring their own laptop computers.
3. Pros and Cons of poster and panel sessions were discussed at length. It was agreed that poster sessions should be continued. The TCPC is to decide whether a paper will be in a panel or poster session. The poster sessions should be better structured; i.e., the authors and the chair should be required to be present for the whole session. Also, if possible, all poster

sessions should be held at one time, Monday after-noon being the preferred choice for this purpose.

3.2 Technical Paper Reviews

3.2.1 Technical Paper Review Summary

We received 19 transaction papers, which included four resubmits: 8 accepted (two resubmits), two accepted (resubmits) with mandatory comments, 1 rejected, and 8 still out on review.
One 99 Summer Power Proceedings paper abstract was received and approved. No paper was submitted for this abstract.

There was one paper closure received, reviewed, and accepted.

3.2.2 2000 IEEE/PES Winter Power Meeting Papers

There are three transformer sessions and a special technical session on Sound Level Measurements of Transformers are planned for the Singapore meeting.

Respectfully submitted,

B.K.Patel, Vice Chair

4.0 Administrative Subcommittee - John W. Matthews

4.1 Introduction of Members and Guests

Chair Matthews called the meeting to order at 2:00 p.m., Sunday, November 7, 1999, in Jalisco Room of the Crown Plaza Hotel, Monterrey, Mexico.

The following members of the Subcommittee were present:

W. B. Binder, Jr.	B. K. Patel
R. F. Dudley	W. F. Patterson
F. E. Elliott	L. W. Pierce
D. J. Fallon	T. A. Prevost
F. J. Gryszkiewicz	J. Puri
E. G. Hager	H. J. Sim
K. S. Hanus	J. E. Smith
J. W. Matthews	L. B. Wagenaar
P. E. Orehek	

The following guests were present:

Naeem Ahmad
Greg Anderson
Bill Chiu
Alfonso Delgado
Roger Hayes
Alan Wilks

4.2 Approval of the Leon Meeting Minutes

The minutes of the previous Administrative Subcommittee meeting in Leon were approved as written.

4.3 Additions to and/or Approval of the Agenda

The previously communicated agenda was generally followed.

4.4 Meeting Arrangements, Host Reports, and Committee Finances

4.4.1 Meeting Arrangements

Meetings Planning WG chair Greg Anderson reported the following.

- There are several future meeting sites being considered including Varennes, Charleston, Biloxi, and Israel.
- Our next meeting host, Alan Wilks of ERMCO, presented a Spring 2000 Transformers Committee meeting status report. Meetings will be held at Opryland and the room charges have been negotiated to $144.
- Fall 2000 meeting host, Roger Hayes of VA Tech, Ferranti-Packard, reported that the meeting will take place at Sheraton Fallsview (Primary) and Marriott Fallsview and the room charges will range $85 to $150 with average of $110 USD.

4.4.2 Host Reports

The meeting host Alfonso Delgado reported the following registration statistics:

Registrations	
Members and guests	275
Life Emeritus Members	6
Companions	35
Total	316
Tuesday Luncheon	216
Tuesday Evening Social	263

A historical listing of IEEE/PES Transformers Committee meeting locations is attached at the end of these minutes.

4.4.3 Finances

The surplus of $ 12620.21 was carried over to this meeting and we expect to maintain this surplus to about the same level after this meeting.

4.5 Old Business

Loren Wagenaar presented the difficulties associated with meeting conflicts as more meetings are scheduled concurrently and less number of members are representing each company. He pointed out that an average of 6.4 meetings taking place at one time and proposed to extend our meeting by one full day. After a considerable discussion by the AdSub members, Wally Binder made the motion below and Loren Wagenaar seconded.

> Starting with the Orlando, Florida meeting, Fall 2001, we extend the meeting through noon Thursday.

A vote was taken and the motion passed with 13 to 3 favoring the extention.

To make this extension effective, Greg Anderson will develop the Orlando meeting schedule and send to the AdSub members by March 1, 2000.

4.6. 0 IEEE DELEGATION REPORT ANSI C57 COMMITTEE – FALL 1999

4.6.1 The IEEE delegation has responded to six ballots since the meeting in New Orleans. IEEE returned affirmative ballots for the following:

- ANSI/IEEE C57.134/d3 "Guide for Determination of Hottest Spot Temperature in Dry Type Transformers"
- ANSI C57.12.40/d6 "Standard for Secondary Network Transformers, Subway and Vault Types (Liquid Immersed) - Requirements."
- ANSI/IEEE P1277, "Trial-Use General Requirements and Test Code for Oil-Immersed and Dry Type HVDC Smoothing Reactors."
- ANSI C57.12.24/d3 “Requirements for Transformers Underground-Type, Three-Phase Distribution Transformers: High Voltage (34 500 GrdY/19 920 V and Below) and Low Voltage (480 V and Below, 2500 kVA and Smaller)”
- ANSI C57.12.44/R1 “Standard Requirements for Secondary Network Protectors”
- ANSI/IEEE C57.134/d2.1 "Guide for Determination of Hottest Spot Temperature in Dry Type Transformers"

4.6.2 The roster of the IEEE Delegation to ANSI ASC C57 will change effective January 1, 2000. The roster being submitted for PES SCC endorsement is as follows:

- Matthews, J.W., Baltimore, MD - Chair, IEEE Delegation
- Borst, J.D., Jefferson City, MO
- Hanus, K. (alternate), Fort Worth, TX
- Patel, B.K., Birmingham, AL
- Prevost, T.A., St. Johnsbury, VT
- Sim, H.J., Goldsboro, NC
- Smith, H. D., Bluefield, VA

4.7 Committee Service Awards - W. B. Binder

Wally’s full report will be shown in the Committee meeting minutes.

4.8 Chair’s Report - J. W. Matthews

John presented his report which will be included in the Committee meeting minutes.

4.9 Standards Subcommittee - T. A. Prevost

4.9.1 Standards and Coordination Activities

Tom Prevost reviewed his report which will be included in the Committee meeting minutes.

4.9.2 Documents Submitted to the Standards Board

See the status report.

4.10 IEEE Standards Activities – Naeem Ahmad

NesCom minutes are available at http://standards.ieee.org/board/nes/699nesmin.html.

NesCom recommendations at http://standards.ieee.org/board/nes/699nesrec.html.

In minutes, each PAR# is linked to the actual PAR. By clicking on the PAR#, you will go to approved PAR, the signature pages and the approval letter in .pdf format.

As of October 99, for Transformers Committee, 15 ballots were completed and 9 invitations are in process. Also two C57 ASC ballots were closed and additional two are in process.

Please contact Gregory Kohn at 732-562-3831, g.kohn@ieee.org for editorial review of the drafts.

Currently, the Balloting center uses the same form for Initial Ballot and Recirculation. The statement regarding the "failure to return a ballot" only applies to the initial ballot of the standard. Your name will NOT be removed from a balloting pool for failing to return a Recirculation Ballot. Revised form will be used in 2000.

IEEE Standards Companion is under revision and hard copy as well as on-line version will be available by the end of 99.

A web page Standards-Process-at-a-Glance is available now to help WG Chairs / Sponsor Chairs with checklists on each step of the standard process and a simple page of links to help them along the process.

Electronic Balloting Pilot Program for PES is available now. Let Naeem Ahmad know if your group is interested. All members of the balloting group must have access to web and e-mail address. Naeem's contact information are 732-562-3931 (Phone), 732-562-1571 (Fax), or n.ahmad@ieee.org.

Standards Home Page http://standards.ieee.org/db/balloting/ can provide you the Balloting Status Reports and Sign-up to join Balloting Pool.

4.11 Subcommittee Activities - Subcommittee Chairs

4.11.1 Audible Sound and Vibration - Jeewan Puri

No Report.

4.11.2 Bushings - F. E. Elliott

No Report.

4.11.3 Dielectric Tests - L. B. Wagenaar

No Report.

4.11.4 Distribution Transformers - K. S. Hanus

No Report.

4.11.5 Dry-Type Transformers - W. Patterson

No report.

4.11.6 HVDC Converter Transformers & Reactors - W. N. Kennedy/Richard Dudley

No Report.

4.11.7 Instrument Transformers - J. E. Smith

No report.

4.11.8 Insulating Fluids - F. J. Gryszkiewicz

No report.

4.11.9 Insulation Life - L. W. Pierce

Lin Pierce proposed himself to be the new WG chair for Loading Liquid Immersed Transformers and the chair Matthews approved. Lin also reported that IL Subcommittee disbanded two WG's.

4.11.10 Performance Characteristics - D. J. Fallon

Don reported that the WG on Switching Transient by Transformer/Breaker Interaction will not meet due to the chair Degeneff's illness.

4.11.11 Power Transformers - E.G. Hager

Red Hager submitted the following for the AdSub.

Red attended West Coast Substation Subcommittee meeting in Portland, Oregon on October 5 – 7, 1999. IEEE693. "IEEE Recommended Practice for Seismic Design of Substations" is being revised.

Rick Young is retiring as WG Chair for "Diagnostic Field Testing and Monitoring of Liquid Immersed Transformers." Red proposed Andre Lux as the new chair and the Committee chair Matthews approved.

4.11.12 Underground Transformers and Network Protectors - P. E. Orehek

No report.

4.12 Vice Chair's Report - B. K. Patel

Bipin submitted a written report which will be included in the Committee meeting minutes. He requested all AdSub members to review the O&P Manual and return the comments by December 15, 1999.

4.13 Secretary's Report - H. J. Sim

4.13.1 Membership Review

Voting Members - Five new members were added at the last meeting in New Orleans as noted in the meeting minutes. Also there were few changes in voting classification for some members.

Following these changes and prior to the addition of new members at this meeting, membership stands at:

Members -		178
Classifications:	Producers -	85
	Users -	52
	General	41
Emeritus Members -		20

Poor Attendance Records - The invitation list has been revised by removing guests with poor attendance record and adding new guests by request. Members who have not attended a committee meeting since Fall of 1997 will be contacted to determine their interest in maintaining membership.

4.13.2 New Member Applications

Six new members were approved and welcomed. They are, Kal Atout (MGM Transformer Co.), Bill Chiu (Southern California Edison), Don Duckett (Florida Power Corp.), Mike Iman (MGM Transformer Co.), Ibrahim Shteyh (Square D Company), and Stephen Shull (The Empire District Electric Co.)

4.13.3 PES Directory Rosters

Subcommittee chairs are requested to keep the rosters updated as they change constantly. The accuracy of the directory has been known to be unacceptable for some subcommittees and their working groups.

4.13.4 Meeting Minutes

Minutes of the New Orleans meeting were reproduced at no cost, again compliments of Ken Hanus and TU Electric. Postage costs were $ 1,573.50 for 535 mailings, which averages $2.94

per mailing. Note that the net cost of the minutes varies for each meeting and the $10 portion of the registration fee is a valid nominal fee.

I request Subcommittee Chairs to submit their minutes by January 31, 2000 for this meeting. The submittal should be an electronic file on a 3 ½" diskette (Email preferred), formatted in Word 7.0 (or earlier versions). Please indicate total attendance count for each subcommittee, working group, and task force meeting in your minutes. Please do not send me a copy of attendance listing for this attendance count. If someone is preparing minutes for you please let them know these details about submitting the minutes for publication.

4.14 New Business

Effective January 1, 2000, Bipin Patel will be the Committee Chair, H. Jin Sim will be the Committee Vice Chair, and Ken Hanus will be the Committee Secretary. To replace Ken, Ed Smith of HJ Enterprises will be the new chair for Distribution Transformers Subcommittee.

Jeewan Puri proposed (for Phil Hopkinson) to combine LTC and DETC requirements and functional life test requirements to be in harmony with IEC 60214-1 and 60214-2. After some discussion, for the sake of timely completion of the work, AdSub decided to keep it as is.

4.15 Adjournment

John adjourned the meeting at 6:39 p.m.

Respectfully submitted,

H.J. Sim, Secretary

AdSub Attachment 4.4.2-1

IEEE/PES Transformers Committee Meeting Locations

Year	Spring	Fall	Committee Chair
2002	Vancouver, BC, Canada	Open	Sim
2001	Amsterdam, The Netherlands	Orlando, FL	Patel
2000	Nashville, TN	Niagara Falls, ON, Canada	Patel
1999	New Orleans, LA	Monterey, Mexico	Matthews
1998	Little Rock, AR	Guanajuato, Mexico	Matthews
1997	Graz, Austria (summer)	St. Louis, MO	Binder
1996	San Francisco, CA	Burlington, VT	Binder
1995	Kansas City, MO	Boston, MA	Harlow
1994	Dallas, TX	Milwaukee, WI	Harlow
1993	Portland, OR	St. Petersburg, FL	Borst
1992	Birmingham, AL	Cleveland, OH	Borst
1991	Phoenix, AZ	Baltimore, MD	Veitch
1990	Denver, CO	Montreal, PQ, Canada	Veitch
1989	Chicago, IL	Charlotte, NC	Veitch
1988	Washington, DC	Long Beach, CA	Compton
1987	Ft. Lauderdale, FL	New Orleans, LA	Compton
1986	Little Rock, AR	Pittsburgh, PA	Yannucci
1985	St. Louis, MO	Toronto, ON, Canada	Yannucci
1984	Vancouver, BC, Canada	Boston, MA	Savio
1983	Atlanta, GA	Detroit, MI	Savio
1982	Los Angeles, CA	Philadelphia, PA	McNutt
1981	Portland, OR	Phoenix, AZ	McNutt
1980	Williamsburg, VA	Milwaukee, WI	Bonucchi
1979	San Diego, CA	Houston, TX	Bonucchi
1978	Miami, FL	Chattanooga, TN	Bennon
1977	Charlotte, NC	Montreal, PQ, Canada	Bennon
1976	New Orleans, LA	San Francisco, CA	Honey
1975	Lakeland, FL	Denver, CO	Honey
1974	Pittsburgh, PA	Scottsdale, AZ	Alexander

5.0 Transformer Standards - T. A. Prevost

The standards subcommittee met on Tuesday, November 9th 1999 at 3:30PM with three members and twenty guests in attendance.

The minutes from the April, 1999 meeting in New Orleans were approved as written.

The next item was the status of Working Groups.

- C57.12.70 This standard draft has been approved by the balloting group and will be submitted to RevCom in January 2000

- WG for revision of C57.12.80

  Although there was a meeting scheduled for this WG it did not meet. The work has been compiled by Tom Traub from the last ballot of PC57.12.80. It should be ready for recirculation this spring (2000).

- C57.98 C57.98 has been approved for reaffirmation.

- C57.12.00 The latest recirculation has been disapproved by RevCom due to some of the negatives and their comments not being circulated with the recirculation ballot. This standard draft will be recirculated again prior to the January standards board meeting.

- C57.12.90 The revised standard has been approved by the standards board. It is now in editorial review and should be published this year.

■ Discussion of Standards Process

  - Two Year Development Goal.

There is a goal issued by PES to reduce the time to develop standards to two years or less. In future meetings, statistics will be presented which track the progress of standards under development. Each Working Group Chair has been asked to provide a Standards Status Report on Standards projects. This will be reported at the PES Standards Coordinating Committee.

There is a WEB site for standards development assistance maintained by IEEE.

HTTP://standards.ieee.org/resources/glance.html

- Approval Process for IEEE, ANSI and NEMA standards maintained by IEEE

All standards work done by the IEEE PES Transformers committeee requires a PAR regardless of who owns the copyright on the standard. All standards developed or maintained by this committee are balloted through IEEE. IEEE will vote on the ANSI C57 Main Committee ballots only after IEEE Standards Board approval.

The meeting adjourned at 4:15 PM.

6.0 Recognition and Awards - W. B. Binder

6.1 Working Group Recognition Awards

Transformers Committee will not offer a nomination for the PES Working Group Recognition Award for 2000.

6.2 Certificates of Appreciation

Transformers Committee Certificates of Appreciation will be presented to the following for service as Working Group Chairs or Co-Chairs:

Name	Service Rendered
Ken Hanus	Chair, Distribution Transformers Subcommittee
John W. Matthews	Chair, Transformers Committee
Larry Lowdermilk	Chair, Working Group on Thermal Evaluation of Liquid Immersed Transformers

6.3 Transformers Committee Prize Paper Award

One paper was nominated for consideration for 2000 (96 SM 539, "The Effects of Long Term Operation and System Conditions on the Dielectric Capability and Insulation Coordination of Large Power Transformers" authored by P. Balma, R. Degeneff, H. Moore, and L. Wagenaar). This paper is also the Transformers Committee nomination for the PES Prize Paper Award for 2000.

7.0 Reports of Technical Subcommittees

The following reports are those of the technical subcommittees of the Transformers Committee. In most cases they are the complete minutes of meetings held earlier and they are identified as minutes.

Secretary's Note: The subcommittee reports have been edited to the format of the IEEE Style Manual. No changes have been made to the content of these reports except for typographical errors and obvious improvements (removal of attendance lists and general items covered elsewhere).

7.1 Audible Sound and Vibration - J. Puri, Chair

The Subcommittee met on November 8 at 2:00 p.m. with 12-members and 19-guests present. Minutes of the last meeting in New Orleans were approved

Five new members were made welcome to our subcommittee

The following items were discussed:

1. WG Chairman Report

Alan Darvin, the Chairman of Working Group (WG) for writing Transformer Siting Guide has prepared Draft 10 of this guide which will be sent out for balloting. The WG reviewed some minor style related issues relating to definitions, standards, references and bibliography and agreed to send this document for balloting.

2. SC Chairman's Report on IEC Activities:

Jeewan Puri, the Subcommittee Chairman reported that the IEC Sound Measurement Standard 60076-10 has been finalized for voting. It now recognizes sound intensity as a valid measuring technique for demonstrating compliance. U.S. has rejected this standard since it:

- Leaves the choice of measurement methods as a subject of negotiations
- Does not specify any standard sound levels like NEMA TR-1 for transformers
- We will propose a CIGRE Working Group to create an international standard

Jeewan Puri and Jan DeClercq will, jointly, chair the Working Group for changing IEEE C57.12.90 and C57.12.91 test codes for Liquid-Filled and Dry-Type transformers to add Sound

Intensity as an equally valid method for demonstrating compliance with sound level specifications. The first draft of this standard will be presented at the next subcommittee meeting.

A Sound Level Measurement Guide will be written, describing the principles and the interpretation of sound intensity and pressure measurements. This will harmonize the existing IEEE and IEC standards on sound level measurements.

3. New Business:

Jeewan Puri proposed that the present NEMA TR-1 and ST 2 sound level standards should be reviewed and updated so that they may be proposed as an international standard. This provoked the following discussions:

- Why harmonize with IEC?
- What justifies changing these standards now, after deciding 6 years ago to do otherwise?
- We should reference them in our standards as maximum levels
- They are ridiculously high/easy to meet – meaningless

Jeewan proposed a methodology for developing tests of reasonableness for reviewing these tables relating core mass, induction and kVA.

Next Step:

1. Not harmonizing is not an option
2. We need to examine new test data with maximum induction levels
3. There is a need for more manufacturer representation
4. We need to complete this analysis
5. Jeewan Puri will develop a proposal by the next meeting.

Meeting adjourned at 4:05 p.m.

Jeewan Puri

SC Chairman

7.2 Bushings - F. E. Elliott, Chair

7.2.1 Introduction and Membership

Chairman, Fred Elliott opened the meeting at 9:30 AM and welcomed the members and guests. The meeting was attended by 13 members and 14 guests. One request for membership was received. See Attachment -1 for membership list.

7.2.2 Chairman's Remarks

Mr. Elliott reported the following from the Administrative Subcommittee meeting.

- Registration fee for future meetings may vary in order to make each meeting break even
- Next meeting in Nashville, TN, April 2 - 5, 2000
- After that, Niagara Falls, Ontario Canada, October 15 - 18, 2000
- Starting with Orlando 2000 meeting, the duration will be extended by a day. This is being to done to reduce the number of concurrent sections.
- "Technical Study Groups" can be used to develop technical information for a new standard or revision before a PAR is submitted.
- Email is a vital tool for keeping Subcommittee work moving. Members not having an Email address are encouraged to obtain it.

7.2.3 Approval of Minutes of April 14, 1999 Meeting held in New Orleans, LA

The minutes were approved as written.

7.2.4 Working Group / Task Force Reports

7.2.4.1 WG on General Requirements and Test Procedure For Power Apparatus Bushings (C57.19.00)

Keith Ellis reported that his WG met on November 8, 1999 at 1:20 PM with 12 members and 11 guests present. Nine requests for membership were received. He reported the following:

1. Approval of Last Meeting Minutes

The minutes were approved as written.

2. Discussion on Comments Received on PC57.19.00 Draft 3

The WG is in the process of discussing comments received on draft 3. Issues through page 9 of comments were resolved. Details of these comments/discussions will be covered in the WG report.

3. Discussion on C2 Capacitance Measurements on Bushings below 115 kV

Technical issues were discussed but a consensus of opinion could not be reached. Mark Rivers will make a presentation in the next meeting. Decisions were tabled for future meetings.

4. New Business

No new business was discussed.

5. Adjournment

The meeting was adjourned at 5:20 PM after three sessions.

7.2.4.2 WG on Performance Characteristics and Dimensions for Outdoor Apparatus Bushings (PC57.19.01)

P. Singh reported that his WG met on Nov. 8, 1999 at 9:30 AM with 13 members and 9 guests present. He reported the following:

1. Approval of April 13, 1999 minutes of the meeting held in New Orleans, LA

The minutes were approved as written.

2. PC57.19.01 Draft 7 Transformer Committee Re-circulation Ballot Results

A summary of the results from the balloting group was presented is as follows:

Eligible	Affirmative	Negative	Abstentions	Not returned
91	82 (95 %)	4	2	3

No additional comments were received. The four negatives from Draft 6 remained unchanged. A few editorial comments were received from the IEEE Editor.

3. Submittal Package to REVCOM

A submittal package including Draft 7 has been sent to REVCOM and is under review.

Some of the editorial comments from the IEEE editor were addressed. The next meeting of REVCOM is in January of 2000.

A letter from Mr. Posey of REVCOM indicated that 9.20 metric policy has exceptions for converting dimensions in inch based products. A response was sent to the Adm. of REVCOM with copy to Mr. Posey indicating that the WG has carefully considered the interchangeability aspect and changed only the non critical dimensions. Dimensions based on inch sized dies/tools were not changed. Mr. Bruce Barrow, Chair SCC14 concurred with the response.

4. New Business

Mr. G. Villa from Passoni and Villa questioned the adoption of 0.5 % for the OIP bushings. He felt that the low density papers used to achieve these low power factors would have lower dielectric strength. It was explained that this was a collective decision in the WG and that the WG felt that this would result in drier paper and better quality. It was further explained that the actual power factors of new bushings are much lower than 0.5 % and that these bushings meet the dielectric requirements of C57.19.01 and have margins above the required test levels.

It was indicated to Mr. Villa that this was too late to be discussing this subject as the draft is in the final stage of the approval process. It was suggested that the subject be taken up in the Bushing Subcommittee for future discussions.

5. Adjournment

The meeting was adjourned at 10:40 AM

7.2.4.3 Task Force on Draw-Lead Bushings

Russ Nordman reported that his Task Force meeting was held at 10:55 AM on November 8, 1999 with 10 members and 6 guests present. Three requests for membership were received. He reported the following:

1. Approval of Last Meeting Minutes

The minutes were approved as written.

2. Draw Lead Basis of Rating

One review of Dr. Frost's proposed calculation was received early this week. Time did not allow to fully review. We will circulate to the bushing manufacturers for report in the next meeting.

Insulation thickness, watts/lb. and watts/unit length were discussed as parameters in calculating draw lead temperatures. No conclusions were reached.

No comments on Fred Elliott's proposal were received. Manufactures will be asked to review for next session.

It was suggested that work in small groups of manufacturers, to reach common data parameters, be initiated. A proposal needs creation for review in future sessions.

3. Adjournment

The meeting was adjourned at 11:35 AM.

7.2.5 Report from Technical Advisor to IEC 36 A

Russ Nordman reported that there has been no additional meeting. He reported the following:

WG IEC 36A has received a letter from Mr. Villa indicating that a new WG on DC Bushings is being formed. They need a member from the U.S.

IEC 36A had a ballot on a proposal on seismic consideration. A table on resonant frequencies has been created.

A technical report IEC 61464 on DGA has been produced.

7.2.6 Old Business

7.2.6.1 Reaffirmation/Revision of C57.19.100

Fred Elliott reported that fourteen surveys were returned out of the total 43 sent. It was agreed that study groups be formed to review different sections of the standard. SC Chair will assign teams to work on technical information for future revision. A new topic on bushing storage was suggested for inclusion in the standard.

The existing standard is due for action by December 2000. The SC members voted to reaffirm this standard.

7.2.6.2 Technical Paper Summaries

1. Experience with Silicon Sheds on High Voltage Bushings, By Dr. Frost

Dr. Krump of HSP presented the paper and described their experience on composite bushings with silicon sheds.

2. Development of High Current Draw Lead Bushings, By Keith Ellis

Keith Ellis of Haefely described their draw rod concept.

7.2.7 New Business

Bert Hughes expressed the need for information on GIS bus ducts. It was indicated that in some applications the temperatures are very high and could result in accelerated aging of bushings. These problems may be because of eddy current heating and insufficient cooling. Air temperature in excess of 40 C is common in bus ducts applications. The bus temperature may exceed the 70 C limit for the external connector specified in C57.19.00

7.2.8 Adjournment

The meeting was adjourned at 10:40 AM

Minutes Submitted By,

Pritpal Singh, Secretary Bushing Subcommittee

7.3 Dielectric Test Subcommittee - L.B. Wagenaar, Chair

The Dielectric Test Subcommittee (DTSC) met on November 9, 1999, at 2:00 p.m., in Monterrey, Mexico, with 37 members and 31 guests present. Six of the guests requested membership on the subcommittee.

7.3.1 Chair's Remarks

After introduction of the attendees, the Chair reviewed some of the highlights of the Administrative Subcommittee meeting held on November 7, 1999. (See Section 4.0 of Transformer Committee meeting minutes for details).

- The Chair requested that the subcommittee members be sure to include their e-mail addresses on the membership roster. If e-mail addresses are included all subcommittee correspondence will be sent via e-mail.

- There was considerable discussion at the Ad Com meeting about extending the length of the IEEE Transformer Committee meeting. The meeting has been 2 ½ days in length for more than 20 years. In 1983, there were a total of 37 time slots for working groups and subcommittees. The number of required time slots are now up to 70. The proposal to add one additional day passed at Ad Com on a vote of 13 to 3. This change will go into effect at the Fall 2001 meeting to be held in Orlando, Florida.

- There was a lot of discussion in the Ad Com on 2 year versus 4 year Pars. We still have 4 year Pars and do not know when that may change. They have selected 1 Par to be on a fast track to be completed in 2 years. Another idea that was proposed is that technical study groups should be encouraged to study what should be included before the Par is sent to IEEE. This way it would be known what would be printed in the document before the Par is actually sent. This has the added advantage that we would not have to send in revisions to the Par because changes are required.

- Another idea discussed is that we should send the first draft of the documents to the IEEE Editors so that we get them in the proper format initially.

- The next meeting will be held in Nashville, Tennessee, April 2-5, 2000. The following meeting will be held in Niagara Falls, New York on October 15-18, 2000.

7.3.2 Working Group Reports

7.3.2.1 Working Group on Partial Discharge Tests in Transformers

- **J.W. Harley, Chair**

13 members and 53 quests attended the meeting. Attendees introduced themselves. Minutes of the previous meeting April 13, 1999 in New Orleans were approved.

Raymond Lortie, IREQ, presented the paper "Acoustic localization of a fault during the impulse test" that he and Jerome Ndayizamba, Ph. D., ABB wrote. Material from the paper will be included as a section in the Guide for the Location of Acoustic Emissions from Partial Discharges in Oil Immersed Power Transformers and Reactors.

The organization and contents of the next document being written by the Working Group, Guide for the Location of Acoustic Emissions from Partial Discharges in Oil Immersed Power Transformers and Reactors, were discussed. The path we are pursuing in the Working Group is to ballot the "Detection" guide and then add the "Location" guide to it instead of having two guides so closely related.

The letter ballot PAR C57.127 Trial Use Guide For the Detection of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers was briefly reviewed. This guide is being circulated to the previous voters for the second time for their approval of changes to the Safety Warning. The balloting is in accordance with IEEE procedure. The one negative ballot on the Safety Warning has been resolved.

7.3.2.2 Working Group on Low Frequency Tests – Mark Perkins, Chair

The working group met on Monday, November 8, 1999 at 10:20 am with 12 members and 42 guests. 8 guests requested membership in the working group. After the introduction of members, the minutes of the last meeting were approved.

The chairman then reported on the progress on changes to C57.12.90 induced test and C57.113 Recommended practice for partial discharge measurements. The Par for C57.113 has been approved and a request for ballot pool has been initiated.

The group then discussed proposed changes to the temperature correction of Power Factor. Two proposals were considered, one with separate correction curves for EHV Transformers, 230kV and Below Power Transformers, and Distribution Transformers. The second proposal was to allow no correction for Power Transformers. By voice vote of 23 to 13, it was agreed to proceed with the three tiered approach. The chairman will prepare a draft of changes to the test code to reflect this agreed-to change.

Other matters of new business, it was decided to begin work on changes to C57.113 to incorporate digital detector technology. Alain Boliger and Reto Faush agreed to provide information on digital detectors.

Loren Wagenaar suggested we devote a portion of future meetings to presentations on the subject from appropriate experts. The working group supported this recommendation. Volunteers were solicited.

The working group adjourned at 12:05 p.m.

7.3.2.3 Working Group on Revision of Transient Dielectric Tests

- Bertrand Poulin, Chair

The working group met at 2:50 p.m., with 35 people present (19 members and 16 guests). This working group is presently in the process of rebuilding its membership. If anyone is interested in participating in the working group, please contact the chairman.

The topics discussed at the meeting are as follows:

- C57.98 the Guide for Transformers Impulse Test has been re-affirmed during the course of the last year. Although it is due for revision, only in 4 years, the process has been started. A Par is being prepared and will be submitted soon.

- C57.12.90 is continuously being revised. This working group has the mandate to maintain the section on Impulse Test (Lightning and Switching). Subhash Tuli has already received some comments. Unfortunately, he could not make it to this meeting, but he and Bertrand will coordinate our efforts to continue the revision process. Any proposal for changes should be sent to either one of these individuals.

- The issue of correction factors for improper wave shapes to be applied during Impulse Test has reached a dead end. The working group agreed to drop this topic.

- In 1998, Pierre Riffon from HQ made proposals for revising the Test code during transformer impulse test. These proposals have been discussed at the last meeting in Leon (the working group did not meet in New Orleans), but have not been resolved yet.

- One issue of concern, the Lightning Impulse test time to 50% (trial time) of 50 μsec +/- 20%, which is not actually used in too many cases. The present standard allows shorter waves to be used provided that the capacitance of the impulse generator 11 nF or more. According to Pierre, this 11 nF dates from the dark ages of transformer impulse test and does not reflect the current technology. Pierre proposed to replace this 11 n F by a minimum energy level that should be available for this test. After some discussion, it was decided that a new proposal would be prepared which should include a table specifying a minimum generator rated energy for different transformers MVA's for the standard impulse test (lightning). The idea is that shorter waves may be used during full waves test only if the condition in the table are met.

- A second issue of concern is the underswing during chopped wave and the use of resistors in the chopping circuit to limit the underswing. Mr. Riffon's proposal is based on the fact that unless specifically mentioned otherwise in the transformers standards all disposition of IEEE standard 4 apply to transformer impulse testing. In the present version of this standard, the use of damping resistors in the chopping circuit is not allowed. Actually, the standard reads, "the impedance of the chopping shall be minimized by the use of the shortest possible leads to the chopping gap". An the current practice in the transformer industry, impulse resistors and sometime other means of reducing the underswing are often used. It was agreed by the audience that it is acceptable to reduce the underswing to 30% of the rest and this should be defined clearly in the test code.

- Next, the issue of chopping time was discussed. The chopping time is defined in Standard 4. It is basically the time for voltage to collapse during the chopping of an impulse. In Mr. Riffon's proposal, it is not acceptable to use damping resistors or any other means of reducing the underswing if this would increase the chopping time

beyond 0.5 μsec After discussion in the room, a compromise was suggested. It is acceptable to reduce the underswing to 30%, with a tolerance low to 27% for cases where 30% cannot be achieved exactly, provided that the chopping time does not exceed 0.5 μsec. If it does, then it is permissible to reduce the underswing to 35%, not less.

- The last topic discussed was the switch surge test. Again the issue of shorter waves is questioned. The issue was discussed briefly, but was not resolved due to lack of time.

In conclusion of the meeting, it was agreed that a new proposal concerning these topics will be prepared by the chairman with the help of a few members and circulated in the working group for approved and comment.

The meeting adjourned at 4:05 p.m.

7.3.2.4 Task Force on Liquid-Filled Transformers Dielectric Test Tables

- Phil Hopkinson, Chair

The working group met on November 8, 1999 at 4:14 p.m. with 16 members and 21 guests present. Jeewan Puri presented Dielectric Test Tables covering Delta and Wye Connected Winding. A table for Switching Surge and Chopped Wave Test Levels was also presented.

These tables are designed to:

1. Replace present tables 3,4,5,6,7, & 8 in C57.12.00 to reduce confusion in the present information.
2. Introduce a methodology for relating impulse and low frequency tests to the operating voltages.
3. Recommend preferred BIL levels based on the arrester protection levels, taking into account the winding terminal voltage excursions that can occur during line to ground fault conditions. The influence of Wye or Delta winding connections is also considered.
4. Proposes neutral BILs for solidly grounded and through a resistor grounded winding neutrals.
5. Propose switching surge and chopped wave levels that are consistently related to BILs.

This information was well received by the working group, however, many thoughts were expressed in the discussions that followed.

Next Step

The working group will be asked to submit their comments to Phil Hopkinson by January, 2000. These comments will be discussed in the next meeting.

Meeting adjourned at 5:30 p.m.

Discussion of Working Group Report at DTSC Meeting

B. Poulin asked if the Task Force work is being coordinated with the Insulation Coordination Committee? This type of work falls into their scope to assure proper coordination of insulation levels in the Power System. Defining transformer BIL for operating voltages is more of an Insulation Coordination Committee role, than a Transformers Committee.

J. Puri agreed that the Insulation Coordination Committee should be involved in these decisions. The Task Force is in the very preliminary stages and are simply trying to relate test levels to the operating voltages and selecting defined levels.

D. Perco asked if the impulse levels would be coordinated or harmonized with the IEC Standards.

J. Puri said, that the Task Force may not be able to achieve exactly the same levels of the IEC System Operating Voltage because there are slight differences (230kV vs. 233kV). It is very difficult to change some of the long standing practices. The Task Force will suggest a philosophy or approach to determine the levels.

L.B. Wagenaar commented that it was discussed at a previous meeting that IEC specifies switching surge before the BIL or selects them separately. The procedure is to run a system study to determine the switching surge level. IEEE would do the same; the difference occurs when we determine the switching surge level, we go to the table in the standard and select the next higher switching surge level and use the corresponding BIL. IEC has a choice of BIL's. We are essentially doing the same thing except IEC allows a little more choice in the selection.

Sam Metha asked if the issue concerning induced test duration would be harmonized with IEC?

J. Puri said the Task Force is not proposing that the induced test duration be changed in any way. The Task Force will develop the new tables and come to a consensus, then propose harmonizing with the IEC Standards where required.

7.3.3 Status Reports of Specific Standards

C57.12.00 and C57.12.90 - S. Tuli by L.B. Wagenaar

Both C57.12.00 and C57.12.90 have been held up due to some procedural problems identified by the IEEE Standards Board. D. Platts commented that S. Tuli said that C57.12.90 had been approved without all the proposed comments and changes from the last meeting.

D. Fallon clarified the situation by explaining that with the new process of continuous revisions for these standards on a 2 year cycle, comments and changes have to be cut off at some point. The standard will have to be approved with comments that were received a few weeks ago. Other changes received after the cutoff will have to be done in the next revision of the standard.

7.3.4 Liaison Reports

7.3.4.1 Insulation Coordination – John Crouse by L. B. Wagenaar

John Crouse reported at the last meeting that the Insulation Coordination Committee had completed their document but there were some problems with references. There problems were resolved and the document re-submitted. The document should now have been published.

7.3.4.2 Surge Protection Devices – Bob Degeneff

(no report)

7.3.4.3 IEC TC14/WG24 – Loren Wagenaar

No meetings attended in past 6 months, nothing to report.

7.3.4.4 CIGRE/IEC/PSIM Work on Waveforms and Test Data Generator Program – Bertrand Poulin/Ernest Hanique

(no report)

7.3.5 Old Business

7.3.5.1 IEEE - 4 Art Molden/Bertrand Poulin

No report or information available at this meeting.

7.3.5.2 Phase to Ground Clearances – B. Chiu

The Task Force to research the NEMA Standards to see what is included for phase to ground clearances found that the 1980 version of the NEMA Standard included phase to ground clearances for the voltages 1.2kV-230kV. The question was whether or not IEEE should include phase to ground clearances in C57.12.00. The feeling of the membership was that these clearances should be included.

7.3.6 New Business

7.3.6.1 Insulation Coordination – B. Poulin

Concern was voiced that the DTSC should not be changing voltage levels in the tables in C57.12.00. Changing these voltage levels is the role of the Insulation Coordination Committee. The DTSC mandate is not to change power system requirements, but to acknowledge and establish transformer requirements. Power System Insulation Coordination is not part of this mandate. These levels should be established by the Power System Group.

L. B. Wagenaar agreed with this view with the following observations:

- No voltage levels are being changed for WYE-connected transformers.

- For delta-connected units we may be breaking new ground. We are currently using an adaptation of the current transformer standards to test delta-connected units. In some cases, this may not be testing them correctly. The DTSC needs to study this situation and give our recommendations to the Insulation Coordination Committee. The DTSC can not change the table ourselves.

With no other New Business, the meeting was adjourned.

7.4 Distribution Transformers-K.S. Hanus

7.4.1 Chair's Remarks & Announcements

The meeting convened at 2:00 PM in the Jalisco Room with the introduction of the members and guests and signing of the attendance roster. There were 21 members and 13 guests in attendance.

Minutes of the meeting in New Orleans, LA were approved with no changes.

The chairman covered key points of the ADCOM meeting from the prior Sunday afternoon. See Clause 4.0 for details.

The discussion of extending the meeting by another day was followed by concern over the Standards Boards perception that many groups are not producing standards fast enough. In the future the Standards Board will not be as willing to issue PAR extensions unless there is a good reason and "We needed more time" will not be acceptable. The WG chairs are going to have to do a better job of keeping work on track and on time. One new item will be the reporting of working group status to technical council via GANT charts. Working group chairs will be responsible for producing the GANT charts.

Working group chairs are reminded that work such as forming a study group or producing a first draft can be done before the PAR is approved. This can make the document development happen much quicker when the PAR is approved and the clock starts ticking.

STANDARDS BOARD ITEMS

- C57.12.34 needs to apply for a PAR extension so the PAR is not withdrawn by the Standards Board.
- C57.12.36 has been twice disapproved. Plans are to submit it again along with C57.12.10 to show the need for .36.
- C57.12.23 has been re-affirmed
- C57.15 has been approved

New Transformer committee members from the Distribution Transformer SC include Don Duckett and Stephen Shull.

Ed Smith was approved as the new Distribution Transformer Subcommittee chairman because of Ken Hanus moving up to secretary of the main committee.

7.4.2 Working Group Reports

7.4.2.1 C57.15 Voltage Regulators

The working group did not meet but the co-chair reported on the status of the document. The document was approved at the September standards board meeting. The 50+ comments from balloting were resolved and the three negatives were withdrawn. The document has obtained C57 approval and now will be going to IEEE for publishing.

7.4.2.2 C57.12.20 Polemount Transformers

The working group convened with 13 members and 15 guests.

Most of the meeting consisted of reviewing proposed changes decided upon at the last meeting. The changes reviewed included:

- Include "B" style hanger on larger kVA sizes in lieu of the "C" style hanger.
- Include arrester mounting pad dimensions and location – for units 125 kV BIL & less – 2 ½" spacing, 3 5/8" down; for units greater than 125 kV BIL – 9 ¼" spacing, 3 5/8" down from the top edge of the tank.
- Discussion of including tank top dielectric requirements – Glenn Anderson to survey EEI for further information.

7.4.2.3 C57.12.23 Single Phase Underground Transformers

The Working group met with 10 members and guests.

The chair reported the re-affirmation had been approved by the standards board.

The working group proceeded with reviewing draft I. The following changes were agreed upon:

- Add 19.9 kV, 150 kV BIL units
- Table 2, include number of LV bushing / leads
- Verify 500 kCMIL leads can be worked with a 12" radius
- Expand figure 1 to show combination of high-voltage and low-voltage terminals
- Apply metrification to the document based on subcommittee recommended guidelines

7.4.2.4 C57.12.25 Single Phase Deadfront Padmount Transformers

The working group did not meet but the status of the ballot was reported on. The ballot obtained enough returns with the minimum number of affirmatives. The working group will consider making some changes based on the negatives and comments and will consider re-balloting the document.

7.4.2.5 C57.12.33 Loss Evaluation Guide

The working group did not meet but the following update is provided.

The document was balloted with sufficient returns and sufficient affirmative votes. Working group co-chairs will work on getting negatives resolved and finish up the balloting procedure.

7.4.2.6 P1388 Electronic Data Transmittal

The working group did not meet but the following update is provided.

The document was balloted with sufficient returns and sufficient affirmative votes. Working group co-chairs will work on getting negatives resolved and finish up the balloting procedure.

7.4.2.7 C57.12.34 Three Phase Padmount Transformers

The working group did not meet but plans to have a draft mailed out before the next meeting for comments so the document can be finalized. The working group is going to have to obtain a PAR extension to allow time to complete the document.

7.4.2.8 C57.12.36 Distribution Substation Transformers

The working group did not meet but the following update is provided.

The Par has been disapproved twice now because of concern by the standards board the document is in conflict with C57.12.10. It is the intention to submit PAR's for C57.12.10 & C57.12.36 at the same time to illustrate the two documents do not overlap and both are needed.

7.4.2.9 Coating Integrity Documents (.28, .29, .31 & .32)

.28 Padmount Enclosures- The document has been released for print with a 1999 date.

.29 Padmount Enclosures-Coastal Environments – Same report as for .28.

.31 Polemount – Nothing to report at this time.

.32 Submersibles – The working group is to meet in New York in December to work on the document.

7.4.3 Old Business

Dudley Galloway made a presentation on the issue of metrification and what measurements should be converted and how it should be done. After the presentation there was much discussion and the result was further work is needed to provide a guideline to working group chairs on this issue. It appears on certain dimensions the working groups will have a lot of discretion to decide which units to convert to metric and which to leave as English values. One manufacturer made the comment they would convert any metric values back to English for manufacturing purposes. Further work needs to be done to come up with a guideline to ensure consistency among working groups.

7.4.4 New Business

Ed Smith will be replacing Ken Hanus as the Distribution Transformer Subcommittee chair.

7.4.5 Working group assignments

The current assignments are as follows:

.36 Leon Plaster/John Rossetti

.20 Glenn Andersen / Alan Wilks

.21 Ali Ghafourian

.23 Al Traut/Roger Lee

.25 John Lazar / Ali Ghafourian

P1388 David Rolling/Jerry Smith

.35 Ed Smith

.33 Tom Pekarek/Don Duckett

.34 Sam Michael/Ron Stahara

57.15 Tom Diamantis/Craig Colopy

The meeting adjourned at 3:15 PM

7.5 Dry-Type Transformers - W. F. Patterson, Chair

7.5.1 Chair Remarks and Announcements

The Dry Type Transformer Subcommittee met at 11:00 AM on November 9, 1999 with 16 members and 9 guests present. Introductions were made and the attendance roster was circulated. Minutes from the November 10, 1998 meeting were reviewed and approved. Announcements were held until after the working group reports were given.

7.5.1.1 Working Group Reports

The next order of business was the presentation of the reports of the various working groups. See the following sections for the individual reports:

7.5.2.1 WG Dry Type Specialty Transformers **W. Simpson**

7.5.2.2 Dry Type General Requirements **A. Jonnatti**

7.5.2.3 TF Dry Type Smoothing Reactors IEEE 1277 **R. Dudley**

7.5.2.4 WG Dry Type Hot Spot Differentials **P. Payne**

7.5.2.5 WG Dry Type Test Code C57.12.91 **D. Barnard**

7.5.1.2 Announcements and New Business

After the working group reports, the following announcements were made by the Chair:

The chair proceeded to discuss issues from the Administrative Subcommittee meeting. The details of this meeting can be found in the main committee minutes.

The Chair stated that IEEE C57.12.59: Dry Type Through-Fault Current Duration Guide had been withdrawn and a new working group would be formed to oversee the document for modification, if needed, and balloting. Paulette Payne volunteered to chair the working group.

The Chair also announced that C57.94: Recommended Practice for Installation, Application, Operation, and Maintenance of Dry Type General-Purpose Distribution and Power Transformers required action before December 17, 1999. The subcommittee voted to re-affirm the document. The Chair will ask for an extension to ballot for re-affirmation.

Being no further new business, the meeting was adjourned at 11:30 AM.

7.5.2 Working Group Reports

7.5.2.1 Working Group on WG Dry Type Specialty Transformers

Chair: Mr. W. R. Simpson Jr.

WG 259 met at 4:15 PM on November 8, 1999 in the Oaxaca room of the Crowne Plaza in Monterrey, Mexico with 5 members and 5 guests. After introductions, the minutes of the April 15, 1999 meeting in New Orleans were approved as submitted.

IEEE Std. 259 – Standard Test procedure for Evaluation of Systems of Insulation for Dry-Type Specialty and General Purpose Transformers was approved 26 June 1999 by the IEEE-SA

Standards Board and was published 15 September 1999.

IEC/TC 98 Electrical Insulation Systems Liaison Report: IEEE Std. 259 is technically equivalent to IEC Std. 61857 Part. 1. The new project proposal has been approved to develop 61857 Part 2 – a standard test procedure for the thermal evaluation of EIS for low-voltage wire-wound encapsulated coils.

There being no further work at this time for WG 259, it is recommended that activities be suspended.

Mr. Simpson has agreed to give a brief liaison report on the activities of IEC/TC 98 at the Dry-Type Subcommittee meeting.

There being no further business, the meeting was adjourned at 4:45 PM.

7.5.2.2 Working Group on Dry-Type General Requirements – C57.12.01

Chair: Mr. Anthony Jonnatti Secretary: Mr. John Sullivan

The working group met at 2:50 PM November 8, 1999 at the Crowne Plaza Hotel, Monterrey, Mexico. There were 12 members and 14 guests. Eleven guests requested membership.

Introductions were made and the minutes of the New Orleans, LA meeting were approved as written.

The chairman requested members to re-affirm their membership in the working group. Three members requested removal.

OLD BUSINESS:

1. The Chairman reported that the results of the ballot of the last draft were as follows:

    11 - Approved

    12 - Approved with comments

    3 - Abstained

    10 - Not returned

2. The working group reviewed the 31 comments returned with the last ballot. Thirteen comments were accepted and will be incorporated into the document. The working group did not accept sixteen comments. Four comments addressed issues not within the scope of this standard and were not accepted.
3. There was no other old business.

NEW BUSINESS:

1. There was no new business.

There being no further new business the meeting adjourned at 4:05 PM.

7.5.2.3 Working Group on Dry-Type Reactors - C57.16

Chair: Mr. Richard Dudley

On Nov. 8, 1999 the Dry Type Reactor W.G. met from 8:00 a.m. – 9:15 a.m. and from 9:30 a.m. – 10:45 a.m. in the Oaxaca Meeting Room of the Crown Plaza Hotel in Monterrey, Mexico. There were 4 members and 5 guests present. The following are the highlights of the meeting.

1. The attendance list was circulated.

2. The minutes of the New Orleans meeting were approved.

3. The focus of the meeting was a detailed sequential review of 1277//D10 – Trial Use General Requirements and Test Code for Oil-Immersed and Dry Type HVDC Smoothing Reactors. This document had been submitted to formal IEEE ballot with a closing date of Nov. 8, '99. Therefore specific attention was paid to ballot comments of a substantive nature with an emphasis on the 3 negative ballots. Some editorial comments were dealt with in process but most will be addressed by the Chairman when preparing D11 which will be submitted to re-circulation ballot. A summary of the more important issues discussed are as follows.

   (i) The Forward will be revised to be more specific to smoothing reactors for HVDC application; including referenced papers and standards (e.g. IEC 60071-5, IEC 60919-1, IEC 60919-2, IEC 609919-3).

   (ii) The Scope wording will be slightly modified; "smoothing reactors for HVDC transmission" vs. "smoothing reactors for PLC transmission". Is this consistent with the PAR?

   (iii) 2. References: References will include only those included in the text of the standard; it will be ensured that the standards referenced in the text correlate with those in the list of references. Documents not referred to in the text but deemed of importance will be included in the "Bibliography".

   (iv) 3. Definitions: 3.2.1 Rated Inductance will be eliminated as it is covered in 6.4.1. The definition of incremental induction in 3.2.2 will be that submitted by Lars-Erik Juhlin.

   (v) 4. Letter Symbols. Those not utilized in the text of the standard will be deleted.

   (vi) The second paragraph in 5.2.1 will be made more general. "Minimum ambient temperatures below –40°C should be specified as they may have an impact on the smoothing reactor".

   It was decided not to harmonize with IEC re the definition of ambient temperature until harmonization is achieved between IEC 76-2 and IEEE C57.12.00.

   Based on Lars-Erik Juhlin's input a note will be added to 5.2.1 stating that operation at ambients above 40°C may be possible with no decrease in design temperature rise provided the time duration above 40°C is less than 50% of the reactor thermal time constant.

   (vii) The negative ballot of Stephen Lambert relating to 5.2.2.1 Effect of Altitude on Insulation was discussed. The % increase on test voltage level for altitudes in excess of 1000 m. and up to 3000 m. is as per other IEEE standards; "test voltages…..shall be increased by 6.25% for each 500 m. by which the altitude of

the installation exceeds 1000 m., "There his proposal…… shall be increased by 6.25% for each 500 m. by which the altitude of the installation exceeds sea level" as rejected. However a NOTE will be added as follows.

"NOTE: The altitude correction procedure for dielectric tests carried out at altitudes below 1000 m. on equipment to be installed at altitudes above 1000 m. but below 3000 m. is per other IEEE standards. However when insulation co-ordination margins are small these considerations can be given to applying an altitude correction to the test voltage level for altitudes below 1000 m".

(viii) 6.4.1 Rated Inductance will utilize Klaus Papp's rewrite.

The meeting adjourned at 10:45 a.m.

7.5.2.4 Working Group on Dry-Type Hot Spot Differentials

Chair: Ms. Paulette Payne

WG Chair Payne gave the following report to the subcommittee:

To resolve a negative ballot on Draft 2 of the Guide, Draft 3 was prepared and a Re-circulation Ballot conducted. Balloting closed on October 27, 1999, the results were as follows:

Number of eligible people in Ballot Group	**83**
Affirmative Votes	**70**
Negative Votes	**0**
Abstention Votes	**2**
Total Votes	**72**

86% Ballot Return

2% Abstention

100 % Affirmative

Documentation is being prepared to submit the proposed Guide to REVCOM for approval. The Deadline for submittal to the January 2000 Standards Board Meeting is December 17, 1999. I intend to meet this target.

Chair Payne thanked the WG for their efforts and support.

7.5.2.5 Working Group on Dry-Type Test Code - C57.12.91

Chair: Mr. Dave Barnard Secretary: Mr. Tim Lewis

Acting Secretary: Mr. Gene Morehart

The working group met at 8 AM November 8, 1999 at the Crowne Plaza Hotel, Monterrey, Mexico. There were 12 members and 6 guests.

Introductions were made and the minutes of the New Orleans, LA meeting were approved as written.

OLD BUSINESS:

1. The results of the recent ballot sent to all members of the Dry-Type Subcommittee were reviewed. There were no negative ballots but only 50% were returned. The Chairman will ballot the main committee before the next meeting.
2. There was no other old business.

NEW BUSINESS:

1. The Chairman passed out a proposed new Introduction to be incorporated in the next revision. The changes address the ballot to revise the wording in Clause 9, Load Losses and Impedance. The other changes addressed promises made to address issues concerning power factor testing and hot spot measurements.
2. Don Kline advised the working group that proposed standard PC57.123, Loss Tolerance Guide includes all dry-type transformers in its scope. If this guide becomes a standard, C57.12.91 will have to be revised to harmonize with PC57.123. Mr. Ramsis Girgis, working group chairman of the guide, will be contacted for a copy of the latest draft. The chairman will email copies of the draft to our working group members. One of the requirements of the guide is that the test set must be certified. This development will not impact the progress of the current revision of our test code.

There being no further new business the meeting adjourned at 8:25 AM.

7.6 HVDC Converter Transformers & Smoothing Reactors S. C. - Richard Dudley, Chair

The HVDC Converter Transformers & Smoothing Reactor S.C. met in the Oaxaca Meeting Room of the Crown Plaza Hotel from 10:55 a.m. – 12:10 p.m. on Nov. 8, 1999 in Monterrey, Mexico. There were 6 members and 7 guests present. The following are the highlights.

1. The minutes of the New Orleans meeting were approved.

2. The attendance list was circulated.

3. The status of the converter transformer standard was reviewed by the Chairman. The recirculation ballot was successful; no negatives. The document was submitted to the Standards Board and was approved. Publication will be by the end of 1999.

4. Detailed review of the smoothing reactor standard was continued from the previous meetings of the Dry Type Reactor W.G. Focus was on resolution of the 3 negative ballots resulting from the IEEE formal ballot of P1277/D10 which closed Nov. 5, '99. Comments from "approved with comments" returned ballots were also considered. The following are the highlights.

   (i) The second paragraph of 12.3.5.2.1 will be replaced with Klaus Papp's submittal as it better defines total harmonic losses of an oil immersed smoothing reactor.

   (ii) A second paragraph will be added to 12.5.3.2 to cover the case where an oil immersed smoothing reactor has a lower BIL across the winding than to ground.

"If a lower BIL level is specified across the winding than that specified to ground then a second series of impulse tests shall be carried out with both terminals shorted together and the impulse applied between the connected terminals and ground".

   (iii) 12.6.5 will be modified to give preference to performing the "d.c. wet withstand voltage test" with the reactor or a "mock up" mounted on the support insulators.

   (iv) Re 12.7.9 it was agreed that the surface to be used for calculation of sound power is a semi-hemisphere and not a cylinder as submitted in the comments of Pierre Riffon. This was one aspect of the basis for his negative ballot.

   (v) On one of the "approved with comments" ballots it was suggested that consideration be given to covering the issue of multiple core grounds in 7.1.3. However the S.C. felt that if multiple core grounds were employed they would be brought to one common point inside the tank but there would be only one external

ground. The issue of multiple core grounds is a design consideration. The purpose of 7.1.3 is to specify the external ground connection. Therefore 7.1.3 is satisfactory as written in D10.

(vi) In Table 5a the D.C. Power Test will be designated an "OTHER" test for oil immersed smoothing reactors to be consistent with the test code for dry type smoothing reactors.

All comments associated with the 3 negative ballots and significant comments associated with "approved with comments" ballots were discussed and actions/changes agreed to. On this bases the Chairman agreed to produce D11 for recirculation ballot. This draft will also include all editorial comments received with ballots. The objective will be to submit P1277/D11 to recirculation ballot in Jan. 2000 in order that P1277/D11 can be submitted to March 2000 IEEE Standards Board meeting. The meeting adjourned at 12:10 p.m.

Regards,

Richard Dudley

7.7 Instrument Transformers - J. E. Smith, Chair

7.7.1 Chair's remarks & Announcements:

The subcommittee met on Nov. 9, 1999 with 7 members and 3 guests present.

- The dates and locations for future meetings were announced
- The minutes of the April 15, 1999 meeting were approved as written.
- R. McTaggart requested minutes be provided by WG Chairs in time to send to Jin Sim by Jan. 31, 2000

7.7.2 Working Group Reports:

7.7.2.1 WG C57.13.5 - Working Group on Test Requirements for High Voltage Instrument Transformers 115 kV and above

The working group had two meeting sessions. Both were co-chaired by Joe Ma and Pierre Riffon.

Session 1: 9:00 am – 10.45 am, November 9, 1999

Six members and six guests attended the meeting.

Minutes of last meeting at New Orleans, LA were approved without any revision.

Members were requested to provide correct e-mail information in order to facilitate communication and document exchange. Draft 10 of "Trial Use Guide of Requirements for Instrument Transformers rated 115 kV Nominal system Voltage and Above" was presented with major revision in style, structure and content in order to be in accordance with the standards requirements. A revised Draft 11 will be submitted to the members through e-mail latest January 15, 2000 for review. An internal survey of the document will be subsequently conducted. The results will be discussed in the spring meeting at Nashville, TN. The water content requirements in the Draft 10 are to be reviewed by members for feasibility reasons. The Flowcharts for both routine tests and type tests have also been re-arranged per last meeting. The endurance chopped wave test will remain as a special test item as before. The reference to pressure vessel code for gas-filled instrument transformer is not appropriate and will be replaced with a reference to CSA standard for gas-filled equipment.

Session 2: 10.55 am – 12.10 pm November 9, 1999

Seven members and six guests attended the session.

Because of legal concerns, the terms "Explosion proof" and "Explosion resistant" should be replaced with better terms to describe the special features incorporated to meet the internal arc

fault tests. A procedure, in reference to IEC 60694, to deal with the validity of type test reports was described. There was a concern about the rigidity of the procedure. However, the introduction of the concept in the standard will help the better understanding of the process. The dielectric tests to the instrument transformers for high altitude (above 1000 m) should be performed at the corrected values if the tests are conducted at sea level under normal room ambient conditions. The main objection is that there is no simple way to verify the insulation design is appropriate if we do it otherwise unless we can control the air density of the test conditions.

7.7.2.2 WG C57.13.6 – Working Group on Instrument Transformers for use with Electronic Meters and Relays

The working group met on Nov. 9, with 6 members and 14 guests present.

7.7.3 Chair's remarks & Announcements

The subcommittee met on Nov. 8, 1999, in Monterrey, Mexico, with 5 members and 15 guests present.

7.7.4 Old business

C57.13.2 has been re-affirmed but it is in need of revision. Members were asked to submit proposed changes to Jim Smith.

7.7.5 New business

An updated draft of C57.13.6 circulated for review. Editorial corrections brought up at New Orleans meeting were reviewed and accepted. Two issues raised in correspondence received by the Chair since the last meeting were discussed.

- J. Smith requested a list of proposed changes to C57.13, which expires in 2000.
- One suggestion was to change the value of the "E-0.2" burden to avoid confusion with the existing "B-0.2" burden. By a show of hands, this suggestion was defeated.
- The second suggestion, also raised in prior meetings, was to loosen the accuracy limits to 0.3 (from 0.15) and/or raise the low current test point to 10% of rated current (from 5%). By a show of hands, the accuracy limit of 0.3% at 5% of rated current was accepted. However, the group *did not* wish to elimiate the 0.15% at 5% rating presently in the draft.

The draft was edited to indicate these suggestions, and sent out for survey by the members of this working group in December, 1999.

7.8 Insulating Fluids Subcommittee - F. J. Gryszkiewicz, Chair

The Insulating Fluids Subcommittee and its Working Groups met concurrently in Monterrey, Mexico on Monday and Tuesday, November 8 and 9, 1999. In attendance were 26 members and 42 guests. Four guests requested membership on the Subcommittee. This brings the Subcommittee Membership to a total of 85 members.

The Subcommittee minutes of the April 13 and 14, 1999 meeting in New Orleans, Louisiana were approved as submitted.

7.8.1 Current Subcommittee Projects

7.8.1.1 C57.130 - Trial Use Guide for the Use of Dissolved Gas Analysis During Factory Thermal Tests for the Evaluation of Oil Immersed Transformers and Reactors - Frank Heinrichs, Chair

This Trial Use Guide has successfully completed a Recirculation Ballot. It will be sent to the Standards Board for approval at their next meeting in January.

7.8.1.2 P1258 - Trial Use Guide for the Interpretation of Gases Generated in Silicone-Immersed Transformers - Jim Goudie, Chair

This Trial Use Guide has successfully completed a Recirculation Ballot. It will be sent to the Standards Board for approval at their next meeting in January.

7.8.1.3 C57.104-1991 - IEEE Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers - Frank Heinrichs, Chair

The Working Group met on Monday, November 8. The Working Group Chair, Frank Heinrichs was unable to attend these meetings. The Working Group reviewed Draft 6, which had previously been sent out for a Working Group Survey.

The comments received will be incorporated into Draft 7 which will be sent for a Working Group Survey prior to the next meeting in Nashville.

7.8.1.4 C57.106-1991 - IEEE Guide for Acceptance and Maintenance of Insulating Oil in Equipment - Joe Kelly, Chair

The Working Group met on Monday and Tuesday, November 8 and 9. Draft 3 of this document was thoroughly reviewed. Numerous changes were recommended.

During a previous Working Group meeting, it was suggested that load tap changer oil be included in the revised Guide. Bernhard Kurth, Reinhausen Mfg., prepared the section dealing with this topic and sent it to the Working Group Chair for inclusion in Draft 3. The Working Group Chair discussed the subject of load tap changer oil with Bill Henning, the Working Group

Chair for Load Tap Changer Performance. The Working Group for Load Tap Changer Performance approved the section at their Tuesday meeting in Monterrey.

Draft 4 will be sent to Working Group members for a Survey prior to the next meeting in Nashville.

7.8.1.5 C57.139 - Dissolved Gas Analysis in Load Tap Changers - Rick Youngblood, Chair

The Working Group met on Tuesday, November 9 and reviewed Draft 3 of this document. Comments received will be incorporated into Draft 4, which will be sent to Working Group members prior to the next meeting in Nashville.

7.8.2 Other Business:

At the Administrative Subcommittee Meeting on Sunday, November 7, the Insulating Fluids Subcommittee Chair was informed that two documents, which are under the jurisdiction of the Subcommittee, had reached their five-year life and would be withdrawn by the Standards Committee at their next meeting in January. These documents are:

A. IEEE Standard 637 - IEEE Guide for the Reclamation of Insulating Oil and Criteria for its Use

This document successfully went through a Reaffirmation Ballot after the last meeting in New Orleans. The results of this ballot will be sent to the Standards Board for their next meeting in January.

B. IEEE Standard 799 - IEEE Guide for Handling and Disposal of Transformer Grade Insulating Liquids Containing PCBs

The Subcommittee felt that this Guide no longer contains state-of-the art information. In addition, it was pointed out that Federal and State regulations govern the handling and disposal of PCBs. In view of the foregoing, the Subcommittee voted to request withdrawal of this Guide. The Standards Board will be notified of this action.

7.8.2 **Next Meeting**

The Subcommittee and its Working Groups will meet at the next meetings in Nashville, Tennessee.

Respectfully submitted,

Frank J. Gryszkiewicz, Chair
Insulating Fluids Subcommittee

7.9 Insulation Life - L. W. Pierce, Chair

The Insulation Life Subcommittee met at 8:00 AM Tuesday, Nov. 9, 1999 at the Crowne Plaza Hotel, Monterrey, Mexico. Attendance was 19 members and 37 guests. The minutes of the April 13, 1999 meeting in New Orleans, LA were approved.

7.9.1 Status Reports

Status reports were given for the following projects:

Don Platts on PC1538, "Guide for Determination of Maximum Winding Temperature Rise in Liquid Filled Transformers". A recirculation ballot was completed and the document submitted to IEEE REVCOM. It had to be pulled from the agenda because the revised C57.12.00 has not been approved by IEEE. PC1538 quotes language from the revised C57.12.00 which is not in the 1993 version. PC1538 will be added to the REVCOM agenda when C57.12:00 is approved.

Linden Pierce reported on PC57.100, "Guide for Thermal Evaluation of Liquid Immersed Power and Distribution Transformers". The document was approved by IEEE at the June 1999 meeting and the IEEE project editor has completed editing.

Working Group and Task Force reports were as follows:

7.9.2 Working Group on Loading of Liquid Immersed Transformer - Linden Pierce, Chair.

This is a new working group which has the following objectives:

1. To serve as a study group of the Power Engineering Society to review liquid filled transformer loading issues, particularly new developments.

2. To issue a Corrigenda for C57.91-1995.

3. To revise C57.91-1995

The Working Group had its first meeting on Monday, Nov. 8, 1999 with 17 members and 91 guests in attendance. Two technical presentations were made as follows:

1. "Predicting Transformer Temperatures" by Dry. Daniel J. Tylavsky, Dept. of Electrical Engineering, Arizona State University.

2. "Transformer Life Prediction" by Mark Perkins, ABB Power T&D Company, St. Louis.

7.9.3 Working Group on Thermal Duplicate - Barry Beaster, Chair

The Working Group met on Monday, November 8, 1999 with nine members and thirty-one guests attending. The membership roster has been adjusted by removing those members who have retired or not attended a working group meeting in two years. Three guests who had been attending regularity requested membership. Donald Ayers, of Virginia Transformer, Marion Jaroszewski of Delta Star, and Carlo Arpino of COMED, were accepted a members. The membership roster remains at twenty-one members. An agenda, minutes of the Spring 1999 Meeting, and Draft 2.0 of the guide on Thermal Duplicates was mailed to the WG membership prior to the meeting. Additional copies were available for guests.

The minutes of the New Orleans Meeting were reviewed and approved as written. The remaining time was devoted to review of Draft 2.0 of the document. In addition to the following comments made during the meeting, W.G. members and meeting guests were asked to submit other comments by E-mail to the chairman by December 31st for consideration in a Draft 3.0. the new draft would be sent to W.G. members prior to an IEEE ballot for early 2000. The meeting comments and suggested changes are as follows:

* In section 1.1, remove the reference to C57.12.80 as thermal duplicate will be defined in this document.

* In section 2, the dates on standards should be left open and completed once the document is approved.

* In section 3.2, the term BIL will be replaced with Winding Insulation Design. In the definitions, BIL was not being defined, but rather an insulation configuration.

* In section 3.3, the reference will be added, "as defined in C57.12.90", for the thermal test losses.

* In section 3.4 & 3.5, considerable discussion on the need for both external cooling dissipation capacity and rate was generated. This issue was not resolved in the meeting and W.G. members were asked to study it in more detail and comment back to the chairman.

* In section 3.6, this was to be removed as agreed upon in an earlier meeting and was left in by oversight.

* A Forward for the guide was suggested. It would include a reason for the guide and how it ties to C57.12.00. Linden Pierce volunteered to write the forward. The Background information in section 4.1, was agreed to be incorporated into this forward. The title of section 4 would be that which was the title of section 4.2.

* A lengthy discussion of section 4.2.1.4 and whether regulating windings should be excused from the number of windings required in both the tested and thermal duplicate transformers. Although not resolved, if all other characteristics are met and some supportive data is available, it may be acceptable to ignore the regulating winding. More work will be done on this subject.

* In section 6, the equations should be numbered and a list of nomenclature and symbols should be added to the guide.

* The thermal constants used in the equations may be those used in other loading equations, or may be those adopted by a manufacture for a particular design series.

* The guide should also reference the requirements of document PC 1538, "Guide for Determination of Maximum Winding Temperature Rise in Liquid Filled Transformers", in a bibliography.

7.9.4 Working Group on Revision of Temperature Test Code (Section 11 of C57.12.90) - George Henry, Chair

The Working Group met on Monday, November 8, 1999 with 5 members and 24 guests present. The minutes of the April 15, 1999 New Orleans meeting were approved.

The Chair reported on the results of a survey of Draft 8, mailed prior to the meeting. The deadline for the survey was October 29, 1999. Fifty-two surveys were mailed with 24 returned. 19 approved, 2 approved with editorial comments, and 3 voted negative.

There was a discussion of the negative submitted by Jerry Corkran. Jerry objected to the language in clause 11.2.2 Hot Resistance Measurements, that requires hot resistance measurements on all phases of all windings so that the temperature rise of each phase of all windings can be determined. This issue had been addressed during a previous meeting of the Working Group. During that meeting the Chair believed that the Working Group expressed its clear preference for making hot-resistance readings on each phase of all windings. There was a lot of discussion on this point.

Strong support for each side of the argument was expressed. Since there was only one negative vote on this issue during the survey, the Chair elected to retain the language proposed in Draft 8.

The other negative issue for Jerry was the statement in Clause 11.3.4 Other Temperature Measurements, that "a thermocouple is the preferred method for measuring surface temperature". In his objection, Jerry stated that there are better methods of measuring surface temperature, and that the standard should not prevent the use of more modern equipment in the accuracy is the same or better than a thermocouple. There was very little discussion on this topic. The Chair believes that the current draft is not too restrictive because the first paragraph states, "when measured, the temperature rise of metal parts other than windings shall be determined by use of a thermocouple, suitable thermometers, fiber optic temperature sensors, or other appropriate temperature measurement techniques." This clearly allows temperature sensors other than the thermocouple. The Chair recommended that the thermocouple be retained as the preferred measurement technique until it can be demonstrated that one of the newer methods obtains results with equal reliability and accuracy.

Don Platts and Steven Snyder submitted negative votes because of a technical error in the definition of the liquid temperature rise as determined from the total loss run. This will be corrected.

Don Platts, in his editorial comments on Clause 11.4.3, Correction of Liquid temperature rises for Differences in Altitude, suggested that "we should also recognize the correction needed for units built and tested above 1000 meters and used below 1000 meters. The Working Group agreed that an accurate correction method would be a function of the barometric pressure at the time of test and the relative effects of convective and radiation cooling. Linden Pierce shared with the Working Group a table showing standard atmospheric pressure and temperature for altitudes ranging from 0 to 65 000 feet and discussed briefly a curve published by Montsinger that may be basis of the present equation in the Test Code.

7.9.5 Task Force on Winding Temperature Indicators - M. F. Barnes, Chair

The Task Force on Winding Temperature Indicators met on Monday, Nov. 8, 1999. Chair, Mike Barnes could not attend and Linden Pierce presided. There were 4 members and 21 guests in attendance. The minutes of the April 14, 1999 meeting in New Orleans were approved as written.

The purpose of this task force is to write a technical paper regarding winding temperature indicators, operation in different situations, different cooling modes, and different size transformers, with particular attention to problems of the present technology in certain circumstances.

Barry Ward, who was going to coordinate the paper, has been assigned to an EPRI project of the same subject, and has stated a potential conflict of interest. Barry could not attend.

Phil McClure, Weschler Instruments, handed out a 12 page draft of material he prepared for he paper. This covered current and future technologies.

7.9.6 Old Business

At the November 1998 meeting in Leon, Mexico the language in C57.12.00 about temperature rises of metallic parts was discussed. This was a result of ballot comments on C57.12.00. Although this may seem to be simple to resolve, it became complicated. The issues are locations inside and outside the tank, in contact with and not in contact with insulation, and accessible and not accessible to human touch. Leon Plaster agreed to review this subject for future meetings. It will be carried as an agenda item of the Insulation Life Subcommittee.

Respectfully Submitted by:

Linden W. Pierce

Insulation Life Subcommittee Chair

7.10 Performance Characteristics - D. J. Fallon, Chair

7.10.1 Introduction/Attendance

The Performance Characteristics Subcommittee (PCS) met at 9:30 a.m. on Tuesday, November 9, with 26 members and 32 guests in attendance. 5 of those guests requested membership in PCS.

7.10.2 Approval of Meeting Minutes

The minutes of the April 14, 1999, PCS Meeting in New Orleans, Louisiana, were approved as written.

7.10.3 Chairman's Remarks

7.10.3.1 Administrative Subcommittee Notes

C57.109 Guide for Transformer Through Fault Current Duration – is in the Revcom Agenda for administrative withdrawal in January 2000. Ron Barker has reviewed and will prepare notification to he Standards Subcommittee that we wish this document to be sent for reaffirmation ballot.

7.10.3.2 Membership

5 new members were added to the PCS Roster: Donald Ayers, Virginia Transformer; Bill Chiu, SCE; Harry Friedman, ELCO Industries; Dan Perco, Perco Transformer Engineering; and Steve Snyder, Kuhlman Electric.

Membership roster reduced – letters were sent out to individuals who had not attended any of the last 4 meetings, indicating removal from the PCS roster – thanking them for past participation, and indicating that they would be welcome to renew their participation and rejoin the group.

7.10.4 Agenda Changes - None

7.10.5 Working Group Reports

7.10.5.1 PCS Revisions to C57.12.90 - Pierre Feghali

The WG did not meet in Monterrey. Pierre was not able to attend. This WG continues to work on comments to the recently approved revision of C57.12.90

7.10.5.2 C57.133 Guide for Short Circuit Testing - Nigel McQuin

The WG did not meet in Monterrey. The ballot pool has been formed – but the ballot has not yet been sent out. Chair will check with Nigel to determine status of ballot process, and to determine if assistance is needed in getting this document through the ballot process.

The Chairman requests the cooperation of the committee in approving this document, unless there are definite errors in the document. Previous circulation of this document as a draft within the WG only elicited one set of comments, which hopefully has caught any obvious corrections. The intent is to complete the establishment of this material as a separate document from C57.12.90, and then for all received comments at this ballot to be collated for the revision of the stand-alone document in the next revision cycle.

PCS Chair Don Fallon requests members to consider in the ballot process that the Short Circuit Test Guide will go out of publication shortly if this Ballot is not approved, as the Annex has been removed from the revision of C57.12.90. If concerns for the Ballot on C57.133 can be expressed as comments to an approved ballot, then this needed document will stay in print and any comments will be reviewed by the WG for future revision.

7.10.5.3 Revision of C57.110 - R. P. (Rick) Marek

The Working Group for the revision of the IEEE Recommended Practice for Establishing Transformer Capability When Supplying Nonsinusoidal Load Currents did not meet in Monterrey.

The WG will be dissolved, at least temporarily. Since the revision involved many changes and additions, the document should be used for a year or two before any revision is considered. This would allow time for general application, which would hopefully provide some feed back.

7.10.5.4 Loss Tolerance and Measurement - Ramsis Girgis

14 members and 15 guests attended. 6 requested membership.

First report was on mtg of TF on " Guide for low p.f. power measurements ". The Chairman, Ed So, could not attend. Bill Henning chaired the meeting. Section #4 of the Guide, dealing with sources of errors, was reviewed. The Guide now is close to being complete. The Chairman of the WG will check with Eddy So the status and plan for survey of the Guide and then the full balloting.

Next item presented and discussed in the meeting was the status and plan for the " Loss Measurement " Guide, which is now ready to be sent to the PCS members for survey. The feedback will be discussed in the WG mtg in the spring and the negative comments will be resolved before the Guide is finally sent for balloting.

Next item discussed was data collected from 8 transformer manufacturers on factors they use to convert tested values of core losses, exciting current, load losses, and noise from 60Hz to 50 Hz and vice versa. This data has been reconciled and one set of conversion factors for the different performance parameters has been proposed by the chairman with no opposition from those attending. The chairman requested a # of

manufacturers to submit test data to be used to verify the proposed conversion factors. Those manufacturers who will be providing this data will be added to the list of authors of an IEEE scientific paper which will present the development process of these factors as well as the verification of their accuracy. This paper would be the basis to recommend adding these conversion factors to Stds C57.12.90 and 91. The text to be added to these standards will need to clearly state the purpose of these factors. Also, it will need to indicate that the conversion factor for noise does not account for possible tank , or core , resonances that could occur at one frequency but not the other.

Next item discussed was a plan to add a proposed text for a section on "Measuring Auxiliary Losses " which is proposed to be a subsection of section #9 (Load Loss) in C57.12.90. This test will remain as an " other " test in Table 17 in C57.12.00. It was suggested that this text is sent to the WG members to survey before sending it to C57.12.90 WG to adopt it. This will be done shortly after the meeting.

The meeting was adjourned at 5:20 pm.

7.10.5.5 Semi-Conductor Rectifier Transformers C57.18.10 - S. P. (Sheldon) Kennedy

The Working did not meet in Monterrey.

The WG will be dissolved, at least temporarily. Since the revision involved many changes and additions, the document should be used for a year or two before any revision is considered. This would allow time for general application, which would hopefully provide some feed back.

7.10.5.6 Revisions to C57.12.00 - Donald W. Platts

The WG met on Monday at 1:20 p.m. We had 21 members and 44 guests in attendance.

The minutes of the April meeting in New Orleans were approved.

The Chair reported on the status of Draft 4 of C57.12.00. The ballot of Draft 4 was successful, but the responses and rebuttals to negatives were not completed in time to support the submission to Revcom. It appears that another re-circulation ballot may be required.

At our last meeting we began reviewing comments from Draft 3. Several impedance issues were grouped together and Chuck Simmons agreed to act as Task Force leader to resolve them. His survey for assistance in review produced only 7 responses. The WG was asked to provide e-mail addresses to Chuck so that he can have wider representation for review.

Co-Chair Steve Snyder had recruited 5 other WG members to lead additional Task Force groups. We spent the meeting time divided into our 7 Task Force groups to address the comments from Drafts 3 and 4. This effort will be continued between meetings. Our plan is to gather the issues and survey them periodically, so that we

Can pass those resolved to the Standards SC in time for the next revision of C57.12.00 in 2002, or whenever it is scheduled for submission.

7.10.5.7 Switching Transient Induced by Transf./Breaker Interaction - Bob Degeneff

The Working Group on Switching Transients Induced by Transformer/Breaker Interaction did not meet in Monterrey, as both the Chairman and secretary were unable to attend. The PAR has been submitted and is on the Agenda for January RevCom meeting. I expect the Chairman to be in touch with WG members shortly regarding continuing work assignments.

7.10.5.8 WG on DETC Functional Life Testing – Phil Hopkinson

The Chairman was unable to attend, and Craig Colopy presided over the meeting. Craig made a presentation on behalf of Phil on a proposed De-energized tapchanger specification and related design and routine tests. The meeting took place 3:30 – 4:30 p.m. Tuesday, November 9. Copies of the presentation and supporting documentation will be sent out to the 50 attendees. The intent of this meeting was to form a WG to create a document covering DETC's that can be placed into existing IEEE and IEC standards covering Load Tap Changers

7.10.6 Project Reports

7.10.6.1 Reaffirmation of C57.109 - Guide for Transformer Through Fault Current Duration - Ron Barker

As reported above, Ron Barker has reviewed and will prepare notification to he Standards Subcommittee that we wish this document to be sent for reaffirmation ballot.

7.10.6.2 Single Phase Harmonic Limits – Rick Marek

The Chairman has attempted to set up Liaison contact with the Daniel J. Ward, designated by the Transmission and Distribution Committee (T&DC) as the technical contact for T&DC work on Project P1495, Standard for Harmonic Limits for Single-Phase Equipment. Attempts have been unsuccessful to date.

7.10.7 Old Business

STANDARDS INTERPRETATION

There was a new request for interpretation of Temperature Rise Tests as related to Loss determination. The Chairman worked with Ramsis Girgis to develop a response for review by the ADMINSUBCOM – and the response will be sent to IEEE shortly

7.10.8 New Business

INRUSH CURRENT PRESENTATION

Phil Hopkinson volunteered also to share a presentation he had put together on inrush currents, perhaps as a seminar topic at an upcoming Transformer Committee Meeting. The Chair will review with Phil, and with other possible participants in such a

seminar, to determine if a recommendation will be made for a presentation, and to coordinate with Meeting planner Greg Anderson for possible scheduling.

There were no other items of new business.

7.10.9 Next Meeting

The next meeting will be held in April, 2000, in Nashville Tennessee.

The meeting adjourned at 10:25 a.m.

Respectfully submitted,

Donald J. Fallon

PCS Chair

7.11 Power Transformers Subcommittee: Everett Hager - Chairman

The Power Transformers Subcommittee of the IEEE Transformers Committee met at 10:55 A.M. on Tuesday, November 9, 1999 with 34 members and 25 guests present, including 19 new members.

The minutes of the previous meeting in New Orleans were approved.

The following Working Group reports were presented:

7.11.1 LTC PERFORMANCE WORKING GROUP

William Henning reported that the Working Group on Load Tap Changer Performance met on Monday, November 8, 1999 at 10:55 A.M. There were 13 members and 17 guests in attendance. The first item of business was to approve the minutes of the last Working Group meeting in New Orleans.

The Working Group is preparing a LTC Application Guide and is in the process of reviewing IEC Tap Changer Standards 214 and 542. Adopting these Standards as IEEE Standards is under consideration. Jim Harlow agreed to find out from IEEE, the procedural details on how IEEE might adopt an IEC Standard. The IEC Tap Changer Standards are currently being revised by IEC Working Group 26. A Committee Draft (CD) of the main document will be available by the end of December, 1999. An Application Guide Committee Draft will be available by the end of December, 2000.

Our IEEE Working Group has three members who are also members of IEC WG26. Therefore, minutes and drafts (and inputs) will be available to our Working Group. In addition to the three IEEE WG members who are also members of IEC WG26, we have other contacts on IEC WG26 who can keep us abreast of how the IEC documents are developing. The plan is for our Working Group to review these revised IEC Standards in order to determine if it would be desirable to adopt the IEC Standards.

The Working Group also reviewed Clause 7 of Draft 3.0, titled "Load Tap Changer Oils," from the latest revision of C57.106, IEEE Guide for Acceptance and Maintenance of Insulating Oil in Equipment. This was done at the request of Joe Kelly. The Draft of Clause 7 was prepared by Dr. Dohnal, who is a member of our Working Group. Some editorial changes (typographical in nature) will be forwarded to Mr. Kelly.

The meeting adjourned at 12:10 P.M.

7.11.2 DIAGNOSTIC FIELD TEST AND MONITORING OF LIQUID FILLED TRANSFORMERS (ON-LINE MONITORING) WORKING GROUP AND TASK FORCE

Brian Sparling reported that the group met at 8:00 A.M. on November 9, 1999 with 11 members and 43 guests present. The group has been very active since the last meeting in New Orleans.

The Task Force met in May '99 at the offices of J.W. Harley and produced Draft 5 of the Guide.

The Task Force delivered the Chapter on Transformer Monitoring to the IEEE/CRC Press in July.

The Task Force authored and presented a paper at the 1999 IEEE Electrical Insulation Conference and Coil Winding Exposition in October.

Draft 6 was completed in October.

A liason relationship was established with the IEEE Substations Committee and as part of this relationship, the Working Group will prepare a section on communications and communications protocols.

The group still has a great deal of work ahead of it and is still in need of volunteers. The Working Group adjourned at 9:15 A.M.

7.11.3 PHASE-SHIFTING TRANSFORMERS WORKING GROUP

Edgar Trummer reported that the Working Group met on Monday, November 8, 1999 at 2:50 P.M. with 20 members and 14 guests in attendance.

The minutes of the previous meeting were approved with the notation that Jim Fyvie's name had been misspelled.

Draft 11 had been circulated as a Survey among the Working Group and the bulk of the meeting was devoted to the resolution of the negative comments from this Survey. All negatives were either resolved or assigned to the respondent and author for resolution.

Some of the modifications were:

Equation 5.3.1 was modified to utilize per-unit values rather than percent.

The term "Bucholz relay" was modified to read "Bucholz-type relay."

Figure 4 on Page 29 of the Draft will be reviewed and resketched.

Several guests requested membership, but after discussion these requests were withdrawn due to the relative completion of work by this Working Group.

The Meeting adjourned at 4:30 P.M.

7.11.3 GUIDE FOR THE EVALUATION AND RECONDITIONING OF LIQUID IMMERSED POWER TRANSFORMERS (C57.140) WORKING GROUP

Rowland James reported that the Working Group met on Tuesday, November 9, 1999 at 9:30 A.M. There were 8 members and 38 guests in attendance. 18 of the guests requested membership in the Working Group.

The Working Group was informed that the proposed Guide was renamed "Draft IEEE Guide for the Evaluation and Reconditioning of Liquid Immersed Power Transformers" by recommendation and vote of the IEEE-SA Standards Board. This action was a result of the initial disapproval of PAR PC57.140 and subsequent resubmission under the current title with minor revisions to the purpose and scope (mostly clarifications).

A request was made for a volunteer to serve as Vice-Chair/Secretary. Bill Bartley volunteered to serve in this capacity.

The Draft of C57.140 (Preliminary Introduction, current participants and contents) was presented to the Working Group. The Chair requested volunteers for the preparation of the individual sections of this draft and also requested comments and recommendations for additions or deletions to the present document.

Finally, a survey was taken of those who plan to, or will attend, the IEEE/PES Winter Meeting in Singapore. Five persons indicated that they plan to attend this meeting. Therefore, a Working Group meeting will be held at the 2000 Winter Meeting.

The meeting was adjourned at 10:20 A.M.

7.11.4 WEST COAST WORKING GROUP

Everett Hager reported that the Working Group met jointly with the IEEE Substations Committee's West Coast Subcommittee in Portland, Oregon, on October 5-7, 1999.

The Working Group for IEEE 693, Recommended Practice for Seismic Design of Substations also met. They are revising the Standard that was approved in December of 1997.

7.11.5 REVISION OF C57.12.10 WORKING GROUP

This Working Group did not meet during the Committee Meetings in Monterrey, as it was newly assigned to the Power Transformers Subcommittee.

Chairman Javier Arteaga informed the Subcommittee that:

> The PAR will be submitted before November 19, 1999. Tom Prevost will co ordinate the efforts to meet the due date.
>
> The first Working Group meeting will be held during the Transformers Committee meeting in Nashville, Tennessee, in Spring 2000.
>
> A liason was requested for the Distribution Substation Transformers Working Group, PC57.12.36. Until the first meeting is held, the Chair will act as liason.

7.11.6 NEW BUSINESS

It was reported that C57.116, the IEEE Guide for Transformers Directly Connected to Generators, is due to expire at the end of this year and needs to be reaffirmed. Everett Hager will request a ballot for reaffirmation from the Standards Board.

It was announced that the Subcommittee meeting minutes will be posted on the Transformers Committee website, rather than mailing printed copies to each member. This was briefly discussed with no objections to the plan. Special provisions for members without Internet access were offered, but no one requested a mailed copy.

The Subcommittee meeting adjourned at 11:25 A.M.

These minutes prepared by Joe Watson, Secretary

7.12 Underground Transformers and Network Protectors - P. E. Orehek

7.12.1 Introduction/Attendance

The Underground Transformers and Network Protectors Subcommittee met on November 10, 1999, with 12 members and nine guests present.

7.12.2 Approval of Minutes

The minutes of the April, 1999 meeting in New Orleans, Louisiana were approved as submitted.

7.12.3 Membership

Gary Miller of EEI resigned from the Subcommittee and Iqbal Hussain of General Electric joined the Subcommittee. Membership remains at 14.

7.12.4 Chairman's Remarks

Administrative Subcommittee Notes

A. The next meeting will be held in Nashville, Tennessee from April 2 to 5, 2000.

B. The Administrative Subcommittee approved the extension of an additional day for the meetings of the Transformer Committee. This will allow members to be able to attend more Working Group meetings that were previously held simultaneously. The extended schedule will not take effect for at least a year because of hotel commitments.

C. Effective January 1, 2000, Bipin Patel will become Chairman, Jin Sim will become Vice-Chairman and Ken Hanus will become Secretary of the Transformers Committee.

7.12.5 Working Group Reports

7.12.5.1 Three-Phase Underground-Type Transformers (C57.12.24) C.G. Niemann - Chairman

The Working Group met on Monday, November 8, 1999 at 9:30 a.m. with 11 members and three guests in attendance.

The minutes of the meeting on April 13, 1999 in New Orleans, Louisiana were approved as submitted.

The Chairman informed the Working Group that the Revised Draft Standard was balloted by the NEMA Secretariat. Twenty of the 24 ballots available were affirmative with two ballots having comments. No negative ballots were received. The revised standard will now be submitted to the ANSI Board of Standards Review for approval and will than be published. Congratulations were extended to the Chairman for completing the revision on time.

One comment stated that Note 1 on Figure 2 did not agree with the figure on the high-voltage bushing designation (H1B1 vs. H1B). The Working Group decided that the correct designation should be H1B. This figure and note will be revised and a corrected version sent to the Secretariat.

There being no additional new or old business, the meeting was adjourned at 3:45 p.m.

7.12.5.2 Liquid Filled Secondary Network Transformers (C57.12.40) R. L. Plaster - Chairman

The Working Group met on Monday, November 8, 1999 with 12 members and three guests in attendance.

The minutes of the April, 1999 meeting in New Orleans, Louisiana were approved as written.

The NEMA Secretariat completed balloting of Draft #6 of the revised standard on November 5, 1999. Unofficially, it was reported that the document received balloting approval. Results will be reported later in the week at the C57 Transformer Committee meeting

The remaining time of the session was devoted to discussing the removal of Part II of the Standard, which is for network transformers with a two position internal grounding switch. A motion was made to reinstate this Part into the current Draft. Consensus of the Working Group was that the publication of the document should not be delayed since the present standard contains several errors that have been corrected in the revised draft. The motion was defeated 9 to 3.

Another motion was made for the Working Group to re-examine the inclusion of part II into the next revision. This motion was approved be a 12 to 0 vote.

There being no additional business the meeting was adjourned at 9:15 a.m.

7.12.5.3 Secondary Network Protectors (C57.12.44) D.H. Mulkey - Chairman

The Working Group met on Monday, November 8, 1999 with six members and six guests in attendance.

The minutes of the November 9, 1998 meeting were approved as written. No meeting was held in April, 1999.

The Draft of the revised Standard was submitted to the IEEE balloting process in October, 1998 and concurrently to the C57 process by the IEEE secretariat. The Chairman reviewed the results of the May 17, 1999 IEEE ballot. There were 50 in the balloting Group and 42 affirmative ballots, one negative and four abstentions were received.

Of the 24 ballots available in the C57 ballot, 15 affirmative, no negative and one abstention were received. The ballot was approved by the C57 Transformers Committee.

The one negative ballot received in the IEEE ballot stated the altitude correction factors in the standard are not as strict as those in C37.09. A review indicated C37.09 is for high voltage breakers. The Working Group felt that C37.20, which is for 600-volt metal enclosed switchgear, was the standard that would more correctly apply but has correction factors less stringent than the revised network protector standard. The Chairman will try to get the balloter to change his vote to the affirmative based on this reasoning.

If the negative ballot is resolved, the summary of the results will be submitted to IEEE for Standards Board approval and publication. If it isn't resolved, a PAR extension will be requested and the ballot will be re-circulated for approval.

Of the 42 ballots received, 11 of them included 35 comments of which the Working Group rejected six, 26 were editorial and included in the draft and three were held for future consideration.

There being no additional business the meeting was adjourned at 2:22 p.m.

7.12.5.4 Ventilated Dry-Type Network Transformers (C57.12.57) A. L. Robinson - Chairman

The Working Group met on Monday, November 8, 1999 at 10:55 a.m. with six members and four guests in attendance.

The minutes of the meeting on April, 1999 in New Orleans, Louisiana were approved as submitted.

The Working Group reviewed Draft #9 of the document. Extensive discussion on the dimensions shown in the various figures relating to the conversion from English to metric was held. The dimensions will be corrected to concur with those in C57.12.40. All figures will also be relocated from the end of the standard to within the associated text.

The Standard is expected to be ready for balloting by the next meeting.

There being no additional business the meeting was adjourned at 11:50 a.m.

General

The Subcommittee was very pleased that Noelle Humenick of IEEE Staff attended the Subcommittee meeting. She was very helpful in answering some of the concerns of the members.

7.12.6 Future Meetings

The location and dates for future meetings are as follows:

April 2-5, 2000	Nashville, Tennessee
October 15-18, 2000	Niagara Falls, Ontario, Canada
April 8-12, 2001	Amsterdam, The Netherlands
Fall, 2001	Orlando, Florida
Spring, 2002	Vancouver, British Columbia, Canada

The Subcommittee meeting adjourned at 10:45 a.m.

8.0 Reports of Liaison Representatives

8.1 EPRI - S. R. Lindgren

Memorandum

November 5, 1999

TO: Mr. Jin Sim
Secretary, IEEE Transformers Committee
Waukesha Electric Systems
PO Box 268
2701 Highway 117 South
Goldsboro, NC 27530

FROM: Stan Lindgren, Manager, Power Transformers

SUBJECT: **EPRI LIAISON REPORT**

The following report is for inclusion in your minutes for the November 10, 1999 meeting in Monterrey, Mexico:

1. Static Electrification in Power Transformers:

   - This is the suspected failure mechanism in over 36 core form and shell form FOA transformers worldwide. Recent failures involve 15 year or older transformers worldwide that had just been reprocessed following maintenance work. Failure typically occurs during the first startup or light loading period.

   - Work has focused on the effects of temperature and moisture transients. Phase I of a comprehensive test program was completed on a 333 MVA single phase 500 kV autotransformer that was fully instrumented to monitor static electrification effects during a series of experiments. A broad range of partial discharge activity was produced. A Phase II second round of tests was completed in October 1996. A broad range of static electrification activity was again produced. Tests and monitoring results are being evaluated. The transformer was disassembled and inspected. Evidence of static electrification discharges was found at both the bottom and at the top of the unit.

   - Results of the field tests were reflected in a quarter-scale flow-model experiment that simulated the 500 kV transformer under laboratory conditions and controls.

   - A symposium, *Transformer Reliability: Management of Static Electrification in Power Transformers,* was held May 19-21, 1999, in Monterey, California, with 55 attendees. Several Japanese paper were presented including their consensus recommending the mini-static test as the standard ECT test for transformer oils. Proceedings, TR-113741 are being published, including the conclusion that most of the known SE failures could have been prevented.

2. Moisture Dynamics:

   - Very rapid load changes can cause bubble formation under some conditions and reduce low frequency and impulse dielectric strength by 40%. This has been demonstrated in models with rapid/high overload.

- Additional work has been completed to experimentally study moisture dynamics associated with rapid overloads and cool-down cycles plus detect inception of partial discharges caused by bubble evolution. Moisture moves away from the hot conductor fast and returns very slowly after cool-down. Distribution of moisture in the solid insulation was found to be very uneven and time to dissolve free water is very long. TR-113390, *Power Transformer Behavior During Overload - Phase I: Dynamic Behavior of Moisture*. is now published. Phase II has been completed to study the correlation between moisture-in-oil with moisture-in-paper for a range of conditions and temperature cycles using winding models with moisture contents ranging from 0.5% to 7.0% in paper and pressboard. Phase III started 1/99 to broaden the experimental work and include prototype field applications of a dynamic moisture assessment method on operating conservator-type core-form transformers. TR-114075, *Transformer Moisture-In-Paper Assessment Method – Field trial*, is being published.

3. High Voltage Instrument Transformers & Bushings

EPRI sponsored a workshop 9/90 to provide a forum to compare and categorize failure information, failure modes and potential mitigation measures. This was an outgrowth of the Transformers Committee roundtable in Washington, DC, 4/88. Proceedings, TR 100205, were published. A Project was completed to study fast disconnect switching transient effects on HVCTs. Mathematical modeling was checked experimentally through laboratory tests and switching tests in a 500 kV substation with very high speed instrumentation. Effects of switching resistors during disconnect switching has been studied and found to reduce bus transients and stresses by up to 80%. A final report is published, TR-104961.

A new project is in process to monitor a large number of HVCTs and bushings in laboratories and in service, including on-line tan delta, partial discharge and other available monitoring methods. Units are being tested to failure to evaluate failure modes, sensitivity of monitoring and to develop "end-of-life" criteria for interpretation of field monitoring data.

A Symposium: *HVCTs & Bushings – Failure Prediction & Prevention*, was held September 22-24, 1999 in Portland, Oregon. Proceedings, TR-113649, are being published.

4. Dynamic Thermal Circuit Ratings - DCTR

This project involves all transmission components including power transformers regarding software development and a field test involving two substations on a utility system. The field test has been completed. A final report is published, TR-105421. An IEEE paper, 94 SM 473-9 PWRD, was presented at the IEEE/PES 1994 Summer Meeting in San Francisco. A second paper, "Field Application of a Dynamic Thermal Circuit Rating Method", was presented at the IEEE/PES 1996 Winter Meeting in Baltimore. The method has been extended to include transmission lines. DTCR 2.0 is available to EPRI Substations Asset Utilization, Overhead Transmission, and Underground Transmission Target members.

5. On-Line Transformer Condition Assessment – Green / Yellow / Red

This project is a continuation of earlier EPRI efforts to develop an on-line low cost gas analyzer that were abandoned because of baseline drift of the sensors. A “key gas” analyzer uses metal-insulated-semiconductor (MIS) sensors to monitor individual ppm for hydrogen, acetylene, ethylene and carbon monoxide. A field demonstration program that involved 40 prototypes, starting October 1993. was completed in 1996. An EPRI/Micromonitors/Sandia National Labs collaborative project was initiated 2/99 to solve technical problems that have delayed commercial production of the MIS sensors. An alternative 9-gas analyzer for nitrogen-blanketed transformers has been developed and is now commercially available. This will be followed by a version suitable for conservator type transformers.

Experimental work is in process to identify the dynamic behavior of gases and other byproducts associated with loading and internal problems. Early results show that gases are developed in the form of tiny bubbles that *are not* quickly absorbed into the oil, including gases with high solubility. Knowledge developed will be used in the development of fuzzy logic expert system modules that can provide Green-Yellow-Red indication of transformer operating condition.

6. Power Transformer Remaining Life Prediction & Extension

- Furaldehydes in Transformer Oil

  A project has been in place since 1994 to develop a correlation between furaldehydes in oil samples with degree of polymerization (DP) found in paper insulation samples taken from a significant number of transformers in service. Additional laboratory experimental work has identified trace chemicals that are an early indication of insulation degradation and could be sensed through on-line monitoring.

- Vibration & Frequency Response Analysis (FRA)

  A project has been in place since 1994 to develop a correlation between existing winding conditions and vibration & FRA tests before and after internal inspection and reclamping of the same transformers. The objective was to develop noninvasive field test methods and criteria that can be used to predict winding condition in the broad variety of existing power transformers without entering the transformer. Over 40 transformers have had the initial FRA and internal inspection, and over 20 have had the follow-up FRA test. Results have been applied to assess the condition of a number of core-form and shell-form transformers.

7. Transformer Expert System - XVISOR

   Objective of this project is to capture the knowledge of transformer experts and make it usable in an off-line software tool for evaluation of transformer design questions, condition assessment, problem diagnosis, and identification of maintenance needs. Beta testing has been completed, some modifications made, and EPRI's software acceptance testing is done. XVISOR Version 1.0 is now available to EPRI Substations O&M members. Expansion to add LTC will follow.

8. Guidelines for Life Extension of Substations

   These guidelines, now published in Final Report TR-105070 dated April 1995, include a large section on transformer inspection, condition assessment, testing, and maintenance practices. An updated version is in process.

9. Low Maintenance LTC

   Work is completed to identify and categorize specific LTC problems, causes and populations involved; evaluate existing mitigation measures; and identify R&D needed to achieve substantial reduction in LTC maintenance requirements. A workshop was held November, 1996 in Tampa, FL. to provide a forum for discussion of LTC problems / maintenance / and ways to improve reliability and reduce maintenance. Proceedings were published in TR-108398 dated June 1997. Two EPRI projects to improve understanding of contact coking, oil filtration effectiveness and monitoring concepts were recently completed. Further work is being considered.

10. Continuous On-Line Filter

    A project is underway to develop a passive on-line filter for mounting on transformers to continuously remove moisture, oxygen and oil degradation products to keep oil in pristine condition

cc: J.W. Matthews, Chairman, IEEE/PES Transformers Committee

Dr. Robert Schainker

8.2 SCC4 - P. A. Payne

STANDARDS COORDINATING COMMITTEE 04 – INSULATION SYSTEMS

Status of activities from the October 25, 1999 meeting in Cincinnati, Ohio is noted as follows:

IEEE 1 – *P1 – Recommended Practice for Temperature Limits in the Rating of Electric Equipment and for the Evaluation of Electrical Insulation.* Comments from the ballot survey of the Working Group and SCC 04 were reviewed and resolved. The Draft will be revised and sent to IEEE for balloting.

IEEE 98 – *Standard for the Preparation of Test Procedures for the Thermal Evaluation of Solid Electrical Insulating Materials.* The first draft for revision of the standard will be completed by April 2000.

IEEE 99 – *Recommended Practice for the Preparation of test Procedures for the Thermal Evaluation of Insulation Systems for Electric Equipment.* The document will be revised so that it is consistent with IEEE 1. The development of IEC – 62114 will be closely monitored to determine the future disposition of IEEE 99.

IEEE 943 – *Guide for Aging Mechanisms and Diagnostic Procedures in Evaluating Electrical Insulation Systems.* The document will be withdrawn as IEC 610 covers the scope of IEEE 943.

Due to the retirement of the Chairperson SCC 04, I was elected to succeed him effective December 1, 1999.

Respectfully submitted,

Paulette Payne

8.3 TC 14 TAG - P. J. Hopkinson

8.3.1 PREVIOUS MINUTES

The minutes of the meeting held on 12 April 1999 were approved as submitted.

8.3.2 MEMBERSHIP

Members reviewed the TAG roster and made such changes and corrections as needed.

8.3.3 OLD BUSINESS

C. Colopy provided members with a review of activities at the 7 – 8 October meeting of WG 26 responsible for tap changes. He noted that the WG reviewed in detail the proposals offered on reactive tap changers had been discussed and agreed to include proposed language from the US expert in the working draft document (IEC 60214-1). He noted that the proposal from the US on off-circuit tap changes was discussed and the WG members agreed the proposal was more appropriate for inclusion in the application guide under development than in the product standard. He noted that the WG had tentatively agreed to meet again in December and a committee draft (CD) for

revised IEC 60214-1 would be available by the end of December 1999. A CD for the companion application guide would not be ready until December 2000. He reported that the draft IEC documents become available they will share with appropriate IEEE Transformer Committee chairmen for the development of a US comment. A copy of Mr Colopy's report is attached.

It was noted that a number of the committee's experts participating in TC14 Working Group activities were not present at the Monterrey meeting. Members requested that staff contact these individuals to have them prepare a report on their respective WG activities.

ACTION: Staff contact WG experts and request an update on their respective WG activities.

Members engaged in a brief discussion on the need to ensure that IEEE and IEC documents are harmonized. It was noted that the organization of the TAG, with the inclusion of key members of the IEEE Transformer Committee was intended to accomplish that objective and that would be achieved through the coordination of US responses to IEC voting with those IEEE individuals.

8.3.4 NEW BUSINESS

A. Partial Discharge, Dry-Type Transformers

W. Patterson reported that it was his understanding that the committee (TC14) had begun work on partial discharge in dry-type transformers contained in IEC 60726. Staff indicated that future work had been discussed in TC14 and the possible need to establish additional WG to handle that work. The TAG leadership is unaware of the start of work on partial discharge. The matter will be checked and appropriate notification and action undertaken as soon as practical.

ACTION: Staff check the IEC for an update on the status of work on revising IEC 60726 as it pertains to partial discharge.

8.3.5 TIME AND PLACE OF NEXT MEETING

Members agreed to meet in conjunction with the next meeting of the IEEE Transformer Committee in Nashville, Tennessee, and-1 – 5 April 2000.

8.3.6 ADJOURNMENT

There being no additional business, the meeting was adjourned at 2:05 PM.

REPORTED BY

JOHN A. GAUTHIER

8 NOVEMBER 1999

9.0 Old Business

None

10.0 New Business

We still have some confusion on metric conversion and a committee sponsored direction would help everyone. It was decided to have a special WG under the Administrative Subcommittee to address this issue. Material presented by Dudley Galloway will be used as a starting point.

Some members suggested to post the official “Invitation List” to the committee website. After some discussion, it was decided to have the individuals to request a copy from the committee secretary.

11.0 Adjournment

The meeting was adjourned at 11:40 AM.

Respectfully submitted,

H. Jin Sim, Secretary

Attachment 5

GROUPS	Sanf Apr.96	Burl Oct.96	Graz Jul.97	St.Louis Nov.97	Little R Apr. 98	Leon, MX Nov. 98	NO, LA Apr. 99	Monterrey Nov. 99	MAX	AVG
Committee Registration: Members and Guests	301	287	164	282	267	262	262	275	301	263
Spouses	64	67	91	32	34	49		35	91	53
Luncheon	167	148	108	147	156	262	262	216	262	183
SC ADMINISTRATIVE	21	19	17	19	16	19	22	23	23	20
SC AUDIBLE NOISE AND VIBRATION	34	23	9	22	32	23	28	31	34	25
SC BUSHINGS	32	29	32	23	32	25	11	27	32	26
WG Revision C57.19.00						36	22	23	36	27
TF Draw Lead Bushings		17		21	23	23	20	16	23	20
WG DC Applications of Bushings	19								19	19
WG Revision C57.19.01	30	28	26	24	33	38	24	22	38	28
SC DIELECTRIC TESTS	88	91	58	71	81	80	52	68	91	74
WG Low FrequencyTests	50	49	40	31	42	20		54	54	41
WG Revision of Transient Dielectric Tests						20		35	35	28
WG Rev. Dielectric Tests on Distr. Transf.	16	13		14	21				21	16
TF Rev. Distr. Impulse Guide	16	13							16	15
TF L.F. Transformers Dielectric Test Table							28	37	37	33
WG Partial Discharge Tests	35	44	37	43	51	58	41	66	66	47
SC DISTRIBUTION TRANSFORMERS	37	45	11	37	49	29	36	34	49	35
WG Dist. Substation Transformers C57.12.36						16	22		22	19
WG Overhead Type Distr. Transfs. C57.12.20		23			39	19	35	28	39	29
WG Single-Phase Submersible C57.12.23					41		16	10	41	22
WG Single-Phase Deadfront Padmount C57.12.25		28		35	41		30		41	34
WG Bar Coding				25	40				40	33
WG Loss Evaluation C57.12.33				55	48				55	52
WG Electronic Data Transmittal				20		12			20	16
WG Three-Phase Padmount C57.12.34							23		23	23
WG Step-Voltage and Induction Regs C57.15				26		16	9		26	17
SC DRY-TYPE TRANSFORMERS		33	21	32	22	26	27	25	33	27
WG Test Code C57.91		18		20	23	20	22	18	23	20
WG Dry-Type Reactors	14	8	8	7	9	6	13	9	14	9
WG Dry-Type Reactors - HVDC Smoothing	5	6	12		9				12	8
WG Dry-Type Thermal Eval. and Flammability		27	15	24					27	22
WG Dry-Type General Requirements C57.12.01	20	27	5	30	28	24	18	26	30	22
WG Insulation Req. for Specialty Transf.	11	17		6				10	17	11
WG Cast Coil Loading Guide	19	18	19	21	18		14		21	18
WG Hot Spot Diferentials	34	32		27	33	23			34	30
SC HVDC CONVERTER TRANF. & REACTORS	11	9	8	6	6	7	8	13	13	9
SC INSTRUMENT TRANSFORMERS		26	9	10	13	7	11	10	26	12
WG C57.13.5 Test Req Instr Transf >115 kVA	16		7	13	20	13	12	13	20	13
WG C57.13.6 Instr Transf for Electronic Meters & Relays						9		20	20	15
WG Revision of C57.13	20		9	10	17	8	12		20	13
SC INSULATING FLUIDS	68	69	33	71	84	71	56	68	84	65

Attachment 5

GROUPS	Sanf Apr.96	Burl Oct.96	Graz Jul.97	St.Louis Nov.97	Little R Apr. 98	Leon, MX Nov. 98	NO, LA Apr. 99	Monterrey Nov. 99	MAX	AVG
SC INSULATION LIFE	65	60	18	55	73	58	65	56	73	56
WG Loading Liq. Transformer								108	108	108
WG Thermal Tests	33	32	19		18				33	26
WG Revision of Temperature Test Code	37					24	24	29	37	29
WG Thermal Duplicate	20	37		30	34	24	34	40	40	31
TF Hottest Spot Temp. Rise	51	40		56	67	50	50		67	52
TF Winding Temperature Indicators	48	41	25	26	32	22	16	25	48	29
SC PERFORMANCE CHARACTERISTICS	106	108	49	74	77	52	45	58	108	71
WG Loss Tolerance and Measurement	37	30	27	18	27	25	26	29	37	27
WG PCS Rev. C57.12.00		46	23	19	36	32	75	65	75	42
WG PCS Rev. C57.12.90 Part I	34	49		21	33	43	28		49	35
WG PCS Rev. Short circuit Testing			29	19					29	24
WG Revision C57.110	34	42	22	39		11			42	30
WG Semi-Conductor Rectifier Transformers	28	26	18	19	13		16		28	20
WG Switching Transients			30	22	31	33	40		40	31
WG DETC Functional Life Testing								50	50	50
SC POWER TRANSFORMERS					26	25	42	59	59	38
WG LTC Performance Requirements				34	31	29	25	30	34	30
WG C57.140 Transformer Evaluation & Reconditioning							31	46	46	39
WG Diagnostic Field Testing & Monitoring	89	94	70	66	83	42	20	54	94	65
TF On-line Monitor Communication			27	28	28	28			28	28
WG West Coast	9	12	15	13					15	12
WG Phase Shifting Transformers	36	38	31	26	43	30	31	34	43	34
SC STANDARDS	24	19	9		11	4	5	23	24	14
WG Continuous Revision C57.12.00					8				8	8
WG Continuous Revision C57.12.90					8				8	8
WG Terminology,Definitions,Units,& Markings									0	###
SC UNDERGRND. TRANF. & NETWK. PROTCS.	12	13	6	13	11	14	18	21	21	14
WG Three-Phase Underground Transfs.	10	12	5	13	14	16	10	14	16	12
WG Liquid-Filled Sec. Network Transfs.	12	13	6	16	16	16	17	15	17	14
WG Secondary Network Protectors	11	13	5	16	12	9		12	16	11
WG Dry-Type Network Transfs.					5	7	5	10	10	7

Note: Data maintained for four years only. filename=tcattend.xls