

**IEEE/PES**  
**Transformers**  
**Committee**

**Meeting Minutes**  
**April 12, 2001**

***IEEE/PES TRANSFORMERS COMMITTEE  
MEETING***

***April 12, 2001***

***Amsterdam, The Netherlands***

# IEEE/PES TRANSFORMERS COMMITTEE MEETING

## AMSTERDAM, THE NETHERLANDS

APRIL, 12, 2001

### ATTENDANCE SUMMARY

#### MEMBERS PRESENT

Anderson, Greg	Antosz, Steve	Artega, Javier	Balma, Peter
Barker, Ron	Barnard, Dave	Blackburn, Gene III	Brown, Charles
Chu, Don	Degeneff, Bob	Dohnal, Dieter	Dudley, Richard
Elliot, Fred	Ellis, Keith	Fallon, Don	Franchek, Mike
Griesacker, Bill	Haas, Michael	Hanique, Ernst	Hanus, Ken
Harlow, Jim	Hayes, Roger	Henning, Bill	Hopkinson, Phil
James, Rowland	Jonnatti, Tony	Juhlin, Lars-Erik	Kennedy, Sheldon
Khalin, Vladimir	Lackey, John	Lau, Mike	Lindgren, Stan
MacMillan, Donald	Marlow, Dennis	Matthews, John	McClure, Phil
McNelly, Susan	Sam Mehta	Mitelman, Mike	Papp, Klaus
Patel, Bipin	Patterson, Jr., Wes	Payne, Paulette	Perkins, Mark
Platts, Don	Preininger, Gustav	Prevost, Tom	Puri, Jeewan
Riffon, Pierre	Schweiger, Ewald	Sim, Jin	Singh, Prit
Snyder, Steven	Stiegemeier, Craig	Sullivan, John	Tuli, Subhash
Wagenaar, Loren	Ward, Barry	Watson, Joe	Zhao, Peter

#### MEMBERS ABSENT

Aho, David	Allan, Dennis	Allustiarti, Raymond	Anderson, Glenn
Altman, Mike	Arnold, Jr. Jim	Atout, Khaled	Aubin, Jacques
Ayers, Don	Bancroft, Roy	Barnes, Mike	Bartley, Bill
Bertolini, Edward	Binder, Jr., Wally	Bonnuchi, Joe	Borst, John
Boettger, Bill	Cambre, Jr., Max	Carter, Bill	Cash, Don
Chiu, Bill	Clark, Tom	Compton, Olin	Corkran, Jerry
Crouse, John	Dahinden, Vincez	Diamantis, Tom	Dix, Larry
Duckett, Don	Ebert, John	Feghali, Pierre	Fleeman, Jeff
Foldi, Joe	Foster, Sam	Frank, Jerry P.E.	Galloway, Dudley
Gayton, Carlos	Ghafourian, Ali	Gillies, Jim	Girgis, Ramsis
Graham, Richard	Grunert, Bob	Grubb, Bob	Gryszkiewicz, Frank
Hager, Jr., Red	Haggerty, Kent, P.E.	Hall, Geoff	Hansen, Wayne
Harley, Jack	Hartgrove, Bob	Heinrichs, Frank	Highton, Keith
Hoefler, Pete	Holdway, Tim	Huddleston, Jim	Iman, Mike
Johnson, Jr., Chuck	Johnson, David	Jhonsa, VJ	Kallaur, Gene
Kappler, Cal	Kelly, Joe	Kennedy, Bill	Kim, Dong
Kline, Don	Koenig, E.	Lazar, John	Lewis, Frank
Lewis, Tim	Light, Hal	Loveless, Mark	Lowdermilk, Larry
Lowe, Don	Lowe, Richard	Lundquist, Tom	Ma, Joe
Maguire, Willliam	Marek, Rick	Massouda, Tito	McGill, Jack
McMillen, Check	McQuin, Nigel	McShane, Patrick	McTaggart, Ross
Miller, Kent	Minkowitz, Russ	Molden, Arthur	Moore, Harold
Morehart, Gene	Mulkey, Daniel	Murray, Chuck	Musil, R.J.
Mutschler, Bill	Nicholas, Ray	Niemann, Carl	Norton, Ed
Paiva, Gerry	Patton, Jesse	Perco, Dan	Pekarek, Tom
Pierce, Lin	Plaster, Leon	Poulin, Bertrand	Progar, John
Purohit, Dilip	Raymond, Charlie	Risse, Peter	Robbins, Chris

Robinson, Butch  
Sankar, V.S.N  
Sharma, Devki  
Shull, Stephen  
Smith, Steve  
Templeton, Jim  
Traub, Tom  
Weffer, Felipe  
Woodcock, David

Romano, Ken  
Sampat, Mahesh  
Shenoy, Vic  
Smith, Ed  
Stahara, Ron  
Thenappan, Vis  
Trummer, Edgar  
Wilks, Alan  
Zhao, Tony

Rossetti, John  
Savio, Leo  
Shertukde, Hemchandra  
Smith, Jerry  
Stein, Werner  
Thomas, Ray  
Vaillancourt, Georges  
Whearty, Bob

Ruevekamp, Henk  
Scheu, Bob  
Shteyh, Ibrahim  
Smith, Jim  
Stoner, Ron  
Thompson, James  
Veitch, Bob  
Wimmer, Bill

## **GUESTS PRESENT**

Adams, Carl  
Beauchemin, Claude  
Darovny, Bill  
Delvecchio, Bob  
Foster, Derek  
Gardner, James  
Graham, John  
Kawashima, Takeshi  
Ladroga, Rick  
Millward, Paul  
Nielsen, Jim  
Purra, Elnar  
Shen, Dazhong  
Stensland, Len  
Termine, Guiseppe

Ahmad, Naeem  
Bello, Oscar  
Darwin, Alan  
Eckholz, Klaus  
Fyvie, Jim  
Garnitschnig, Andreas  
Heinzig, Peter  
Kiethly, Dave  
Leuenberger, Boyd  
Munro, Andy  
Nordman, Haase  
Reitter, George  
Simpson, Bill  
Subramanian, Raman  
Wicks, Roger

Baronski, Derek  
Cancino, Alvero  
Davis, Eric  
Fausch, Reto  
Ganser, Robert  
Garza, Joseph  
Holland, J.  
Klaponski, Brian  
Lortie, Raymond  
Nelson, Tom  
Nordman, Russ  
Riboud, Jean-Christophe  
Speegle, Andy  
Swinderman, Craig  
Zhongdong, Wang

Bassett, Tom  
Christini, Mark  
Delgado, A.M.  
Forrest, Alan  
Garcia, Eduardo  
Gauthier, John  
Jaroszewski, Marion  
Kranich, Neil  
Mango, Joe  
Newman, Kevin  
Oommen, TV  
Schwartz, Wes  
Steineman, Andy  
Sysuhenko, Oleg  
Ziomek, Waldemar

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## **IEEE PES TRANSFORMERS COMMITTEE MEETING**

**Thursday, April 12, 2001**

**Chair: B. K. Patel      Vice Chair: H. J. Sim**

**Secretary: K. S. Hanus**

### **1.0 Chairs's report, remarks & announcements – B. K. Patel**

The chair B. K. Patel called the meeting to order at 8:00 A.M. Mr. Patel opened the meeting by covering a few minor announcements. They include:

Charlie Honey passed away about 6 months ago. Charlie will be missed, as he was very active and supportive on the committee.

Everyone needs to make sure e-mail addresses are correct because in the future the use of electronic mailing of minutes and balloting will be more prominent. For those whom are IEEE members it may work well to set up an IEEE alias to keep from having to constantly make corrections to changing e-mail addresses.

The current host, Ernst Hanique then gave a report on the attendance and other statistics on the meeting. The statistics were:

Registration – 265  
Companions – 67  
Sunday Evening – 211  
Nijmegen Trip - 210  
Tuesday Luncheon – 131  
Wednesday Evening Social – 202  
Tuesday Companions Tour – 63  
Wednesday Companion Tour - 57

The Committee thanked Ernst with a round of applause. Ernst also made a special thanks to Greg Anderson for his help in making the meeting a great success.

Bipin then covered the main points of his chair's report shown in full length below

### **1.1 Report on the Technical Council Meeting, January 30, 2001 in Columbus, OH**

Attendance for the Winter Meeting stood at approximately 1660 at the time of the Technical Council Meeting.

#### **1.1.1 Chair's report**

The following is a highlight of the report:

#### **Significant Accomplishments in 2000:**

The emphasis for the year was the reformulation of the Technical Council to better include "new players" who are assuming significant roles in the restructured electric utility industry. The originally proposed plan to restructure the existing technical committees was abandoned at the SM2000 meeting. Rather, the Technical Council added two new committees to fill the identified needs.

- The Emerging Technologies committee will treat matters in which the dominant factor is the research, development and application of emerging technologies for the Power Industry.
- The Policy and Markets Committee will treat matters in which the dominant factor is the commercial aspects of the Electric Power Industry.

#### **Benefits to Industry from the 2000 Work:**

There are two primary benefits to industry accomplished by the technical activities arm of PES, through its technical committees:

1. The exchange of technical information in technical papers and educational formats.
2. The preparation and maintenance of industry standards.

Almost all the committees participate in these activities. The more specific activities are on going and too numerous to itemize.

#### **Benefits to Volunteer Participants from the 2000 Work:**

All committee, sub-committee, and working group members benefit from programs through the sharing of information and ideas. These benefits are exhibited in:

- Paper, panel, and poster sessions or formalized training as through Tutorials and Special Technical Sessions
- Discussions in working group, sub-committee, and main committee meetings during each committee and PES meeting.
- Healthy interaction between industry engineers and academic researchers

#### **Recognition of Outstanding Performance:**

At least 18 PES technical committee members were elevated to IEEE Fellow grade in 2000 or announced for 2001. Various committees report other individual awards such as Working Groups and Prize Papers.

#### **Significant Plans for 2001:**

The major objective for 2001 is to integrate the two new technical committees into the Technical

Council. The two new committees are:

- Energy Policy and Markets Committee
- Emerging Technologies Committee

Particular committees note their involvement in conferences outside of the PES structure, strengthening of liaison with IEC, constant review of the many standards to be acted upon, preparation of Tutorials and Special Technical Sessions and continued membership growth initiatives.

Two points of particular note:

- The Insulated Conductors Committee will hold its regular Fall meeting in conjunction with the T&D Show in Atlanta in October. This will bear watching as to the merits of other committees meeting with various shows in the future. (See Problems and Concerns, below).
- PS Communications is formulating thoughts on a thorough restructuring to include computing and information technology.

### **Problems and Concerns:**

1. Motivation, where required, of volunteers to accomplish tasks in a timely and professional manner. The modifier "where required" is stressed to recognize that **most** volunteers **are** extremely conscientious. In these cases, outstanding performance at lower committee levels culminates in committee officer appointments. It is very unfortunate that the laxity exhibited by some degrades the overall performance to the extent that the whole enterprise suffers; to wit, Transactions Papers Reviews. I plan to institute a procedure whereby new committee officers, normally at the secretary (incoming) level, are made thoroughly aware of their pending responsibilities and obligations as their responsibilities increase.

2. Diminished utility industry support for engineers to participate in professional activities. This seems to be of particular significance to the utility industry; in some committees the participation is increasing in the Producer and General Interest categories to the extent that overall headcount is up.

Particular committee comments:

- Electric Machinery Committee had a problem at the WPM in Singapore in that 14 people had submitted papers that got published in the Proceedings and then they did not show up nor did they pay registration fees. Therefore, they had their papers published for free of charge. Hopefully this problem has now been resolved at the PES Staff level.
- There is a great deal of concern within the membership of the Insulated Conductors Committee about meeting jointly with the T&D Show in October. Many believe that since the ICC requires almost four full days to conduct its normal business, meeting with the T&D show will divert the focus of the ICC's core functions to other PES functions, thus reducing the ICC's productivity and efficiency.

- PS Operations notes that joint standards with NERC would be a major benefit to industry, but NERC has declined to cooperate with IEEE.
- PS Relay Committee laments that they do not have close ties with other technical committees, and often only belatedly hear of activities in other committees in which they would want to have a strong input.
- Switchgear Committee has concerns about PES viability as a standards-writing group in the face of harmonization with IEC. There is the concern that IEC will overwhelm and overtake our efforts. The Chair feels that since many of the users of ANSI gear remain very solidly in the ANSI/IEEE realm, the reports of an IEC takeover are premature.

### **1.1.2 Future meeting changes**

Teddy Puttgen reported the following:

For 2001 and 2002 the meetings schedules will remain as they were in the past. In 2003 this will change and there will be a general meeting in the Spring of each year and in the Fall there will be a conference and exposition. In odd years this will be T&D and in even years the PICA conference. The general meeting is intended to provide a forum, which will encourage those committees who meet separately to hold their meetings in conjunction with the general meeting in order to reap the benefits of cross committee discussions, especially in the areas of emerging technologies. However, it is not a requirement that the all committees meet with the general meeting.

A proposal for the schedule of the general meetings was sent to each Technical Committee Chair for review and will be finalized by the time of the Vancouver meeting (July 15-19,2001).

## **1.2 Transformers Committee report to Technical Council**

The following is an abbreviated version of my report to Technical Council for the Committee:

### **1.2.1 Committee meeting activities**

Our Fall 2000 meeting was held October 15-18, 2000 in Niagara Falls, Canada. Mr. Roger Hayes of VA TECH Ferranti-Packard Transformers Limited was our host. A record total of 361 members and guests attended the meeting.

Membership of the Transformers Committee currently stands at 182 members and 19 Emeritus members. The regular members consist of 87 producers, 53 users, and 42 general interest. Our invitation list consists of approximately 600 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, technical presentations, peer review of technical literature on related subjects; and to support the efforts of the Power Engineering Society.

## **Future Meetings**

### *Spring 2001:*

April 8-12, 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:*

October 14-18, 2001, Orlando, FL, USA. Contact Joe Watson (co-host) @ Florida Power & Light + (561) 691-2206, fax (561) 694-4161 or John Progar (co-host) @ 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.

## **1.2.2 2001 Winter Power Meeting technical sessions**

The Transformers Committee is sponsoring one presentation session on transformers during the Winter Power Meeting.

## **1.2.3 Transformer standards and coordination activities**

The Transformers Committee takes responsibility for development and revision of IEEE Standards that fall within its scope. These Subcommittees currently have over 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.Transformerscommittee.org>**

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.

## **1.2.4 Other noteworthy activities**

The Transformers Committee recently created a new working subcommittee called "Meeting Planning Subcommittee". This active group consists of individuals and hosts of previous meetings that assist and "train" upcoming meeting hosts in organizing and executing a meeting. One of the goals of this new Subcommittee is to simply make meetings more enjoyable to attend. We find that attendees are more focused and productive at meetings that are similar in appearance & schedule and are held at comfortable facilities. As result, the attendance at the Committee meetings has grown with new participants. Over 300 members & guests and over 90 spouses/companions attended each of the last two meetings.

We have also expanded and improved our web page mentioned above into a very useful focal point where members and interested parties can obtain general news and information about future meetings and download past meeting minutes. We have also incorporated an on-line meeting pre-registration process provided by IEEE Travel & Conference Management Services ([www.ieeeconferences.org](http://www.ieeeconferences.org)) which allows attendees to register for meetings and events via the Internet using a major credit card. It is also becoming much easier to host a Transformers Committee meeting. Services such as on-line pre-registration, outsourced on-site registration services, and centralized financial services (also provided by IEEE TCMS) has allowed the host to "be a host" and concentrate on local issues. Those interested in hosting a future Transformers Committee meeting can contact Greg Anderson at [gwanderson@ieee.org](mailto:gwanderson@ieee.org).

Bipin K. Patel, Chair

## **2.0 Approval of minutes of October 18, 2000 - B.K. Patel**

The minutes of the Niagara Falls meeting were approved as written.

## **3.0 Administrative Subcommittee – Bipin K. Patel**

Chairman Patel covered the key points of the Administrative Subcommittee Meeting held on April 8, 2001. See the Administrative Subcommittee Meeting Minutes in full length below for details.

### **3.1 Introduction of members and guests**

Chair Patel called the meeting to order at 2:00 p.m., Sunday, April 8, 2001, in the Orange 1 Room of the Hilton Amsterdam Hotel in Amsterdam, The Netherlands.

The following members of the Subcommittee were present:

K. S. Hanus	B. K. Patel
R. F. Dudley	D. Platts
F. E. Elliott	Greg Anderson
D. J. Fallon	T. A. Prevost
Wes Patterson	J. Puri
H. J. Sim	J. W. Matthews
L. B. Wagenaar	

The following guests were present:

Naeem Ahmad  
Peter Balma  
Terry deCourcelle  
Ernst Hanique  
Tom Lundquist

### **3.2 Approval of the Niagara Falls meeting minutes**

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

### **3.3 Additions to and/or approval of the agenda**

The previously communicated agenda was generally followed except with the following changes and additions:

Susan McNelly will report for Frank Gryszkiewicz, John Sullivan will report for Carl Niemann, Tom Lundquist will report for Red Hager. Additional items include discussion of the altitude correction factor, sharing committee mailing list to outside parties and the upcoming corrections

to the O&P manual.

### **3.4 Meeting arrangements, host reports, and committee finances – G.W. Anderson**

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

### **3.5 IEEE delegation report ANSI C57 Committee – J.W. Matthews**

#### **3.5.1 Ballots**

The Delegation has responded to nine ballots since the meeting in Niagara Falls, ON, Canada.

Affirmative ballots were returned for the following:

- PC57.12.59/D3.2 Revision: “Guide for Dry-Type Transformer Through-Fault Current Duration”
- PC57.12.80/D3 Second Recirculation: “Standard Terminology for Power and Distribution Transformers”
- PC57.16-1996 Reaffirmation: “IEEE Standard Requirements, Terminology, and Test Code for Dry-Type Air-Core Series-Connected Reactors”
- PC57.19.100-1995 Reaff. Recirc.: “IEEE Guide for Application of Power Apparatus Bushings”
- PC57.93 Reaffirmation: “IEEE Guide for Installation of Liquid-Immersed Power Transformers”
- PC57.123/D1.7: “Guide for Transformer Loss Measurement”
- PC57.135/D12 Recirculation: “Guide for the Application, Specification and Testing of Phase-Shifting Transformers”

Abstention ballots were returned for the following:

- C57.12.32/D4 “Enclosure Integrity for Submersible Equipment”
- C57.12.57 “Ventilated Dry-Type Network Transformers 2500 kVA and Below, Three-Phase, with High Voltage 34 500 Volts and below, Low Voltage 216Y/125 and 480Y/277 Volts - Requirements”

These two ballots were voted as abstention due to the procedural issue of lack of indemnification for IEEE working group members while developing a NEMA copyrighted document.

#### **3.5.2 Processes for development of NEMA copyrighted C57 documents**

**(4/12/01 Addendum – An agreement has taken place subsequent to the submittal of this original report, which will eliminate the need for the March 13, 2001 actions detailed below. IEEE and NEMA Staffs held a telephone conference on 4/11/01. During this conference they agreed to pursue a joint copyright agreement under which the IEEE**

**working group members will be provided indemnification by IEEE. A goal was established to complete this agreement by May 14, 2001.)**

NEMA will not indemnify IEEE working group members while developing a NEMA copyrighted document. IEEE provides indemnification of all working group members on their copyrighted documents. IEEE requested NEMA to transfer copyright of certain C57 documents to IEEE last year in order to provide this indemnification. NEMA has taken no action regarding this request.

With concurrence of the Administrative Subcommittee of the Transformers Committee, a letter was sent to Sheldon Kennedy, Chair of the NEMA Transformer Section, on March 13, 2001, stating the following:

“Due to the fact that IEEE Transformers Committee members participating in the development of NEMA copyrighted C57 documents are not indemnified by NEMA, and that we have not been able to obtain agreement from the NEMA Transformer Section regarding transfer of copyright from NEMA to IEEE, we find it necessary to cease our work on the following documents:

ANSI C57.12.10, .20, .22, .24, .25, .28, .29, .31, .32, .40, .50, .52, .55, and .57.

We regret having to take this action, but no acceptable alternative has been presented to avoid it. We realize that NEMA may not be able to provide maintenance for some of the subject standards which industry needs. We are prepared to develop new C57 standards under IEEE copyright to meet these needs.

Also note that the ASC C57 ballots on the documents listed above which have been worked on by IEEE Working Groups will be voted as Abstention due to the procedural issue of lack of indemnification.

These actions will be effective immediately.”

### **3.5.3 Present roster**

The present roster of the IEEE Delegation to ANSI ASC C57 is as follows:

- Matthews, J. W., Baltimore, MD - Chair, IEEE Delegation
- Borst, J. D., Jefferson City, MO
- Hanus, K. S. (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

John W. Matthews, Chair

### 3.6 Committee service awards – J. W. Matthews

John's full report will be shown in the Committee meeting minutes.

### 3.7 Chair's report – B. K. Patel

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

### 3.8 Vice Chair's report – H. J. Sim

Jin's full report will be included in the Committee meeting minutes.

### 3.9 Secretary's report – K.S. Hanus

#### 3.9.1 Membership review

Voting Members - Three new members were added at the last meeting in Niagara Falls, Canada as noted in the Niagara Falls meeting minutes. Also since the Niagara Falls meeting Paul Orehek and Bill Saxon have indicated they no longer wish to remain members of the committee, therefore their names have been dropped from the membership.

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

Members -		180
Classifications:	Producers -	88
	Users -	50
	General -	42
Life Members		1
Corresponding Members -		1
Emeritus Members -		21

Poor Attendance Records - The invitation list has been revised by removing approximately 66 guests with poor attendance record and adding new guests by request. Members who have not attended a committee meeting since the Spring of 1999 will be contacted to determine their interest in maintaining membership. The invitation list has approximately 432 names on it at this time.

#### 3.9.2 New member applications

Six new members were approved and welcomed. They are Ken Romano of Georgia Power Company, William Bartley of Hartford Steam Boiler Inspection and Insurance Co, Philip McClure of Weschler Instruments, Tony Zhao of Instrument Transformers, William Griesacker of Pennsylvania Transformer Technology, Dennis Marlow of Prolec GE, Gene Blackburn III – Consultant and John Progar of Ohio Transformer.

### 3.9.3 PES directory rosters

Subcommittee chairs are requested to keep the rosters updated as they change constantly. Sometime this summer the secretary will be asking for updated rosters for the 2002 PES directory.

### 3.9.4 Meeting minutes

Minutes of the Niagara Falls meeting were reproduced at a cost of \$2,077.68 and postage costs were \$ 1,625.75 for 348 mailings, which averages \$10.62 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 May 31, 2001 for this meeting. The submittal should be an electronic file via e-mail, formatted in Word 97 (or earlier versions) and it would be appreciated if the minutes are put in the format (numbering, etc.) as shown in the minutes. 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.

## 3.10 IEEE standards activities – Naeem Ahmad

### 3.10.1 Paper Balloting of Standards

The IEEE Standards Department can assist you in conducting your sponsor level ballot. Following checklist will assist you in providing us with the complete package of materials. Please mail this package to your Standards Staff Liaison. **Please do not send me draft as attached file.**

#### I. Two copies of the draft on 8-1/2 x 11” paper.

*(Copies of the draft are not required for reaffirmation ballot.)*

- Each page must be numbered in the proper order.
- Each page must have project # and draft #. ( Example: C57.12.00/D5)
- Each page must have current date.
- Complete IEEE copyright statement with current year on the first page is a must.
- Short IEEE copyright statement with current year in a “footer” on each page is a must.
- Title must be same as on approved PAR and should have the word “Draft” ( Draft: Title)
- Complete figures, tables and annexes at proper place.
- Only metric units are allowed in the normative portion of the standard. Inch-pound data may be included in footnotes/annexes. Submit necessary exception request to Bruce Barrow of SCC14 (301-493-4374; b.barrow@erols.com).

**II. A balloting letter addressed to the balloters explaining the purpose of the ballot.** (Refer to Annex A of the IEEE Standards Companion for sample correspondence. This document is also available on the Standards home page <http://standards.ieee.org>. Go to policies and procedures under Standards Development.)

- The person who will receive the ballot summary upon completion of the ballot will write this letter. This is usually the Working Group Chair/Standards Coordinator.
- This letter will include address, telephone and fax numbers, and e-mail address.

**Upon receipt of the above, The Balloting center will:**

1. Conduct an invitation-to-ballot to form your balloting group.
2. Prepare a ballot form, which will be read by optical mark reader.
3. Duplicate your draft, send to the balloters /coordination contacts listed on the PAR.
4. Enter names and Interest Categories into database for all balloters.
5. Mail out the ballot form, cover letter and draft, and record responses.
6. Approximately 10 days before the ballot closing, will provide you with contact information for those persons who have not returned their ballots.
7. Provide you ballot summary and comments received, after the ballot has closed.
8. Conduct a recirculation ballot when necessary.

### **3.10.2 Items of interest**

- In 2000, for Transformer Committee 16 ballots were completed and as of 3-31-2001 there are 7(one electronic) ballots in process. Also, last year 13(4 failed) C57 ASC ballots were closed and as of 3-31-2001 there are 5 ballots in process.
- **Electronic Balloting is recommended choice now.** All members of the balloting group must have access to web and e-mail address. **Please do not send me draft as attached file.** Contact me when your draft is ready and I will provide you instruction and location to post the draft.

Useful training modules in Microsoft PowerPoint can be obtained at <ftp://stdsbbs.ieee.org/training/>. See <http://standards.ieee.org/faqs/ltpres.html> for more information. Working Group chairmen and members will find one or more modules of interest.

- A web page Standards-Process-at-a -Glance is available to help WG>>Chairs/Sponsor Chairs on each step of the standard process and a simple page of links to help them along the process. Go <http://standards.ieee.org/> and select Standards-Process-at-a -Glance under Standards Development.
- The *Standards Board Operations Manual* has been revised. It is available in hard copy and at <http://standards.ieee.org/guides/opman/index.html>. A revised *Standards Companion* will be

available in a few months. Working Group chairmen will find helpful information on development of standards, balloting and submission to the Standards Board in both publications.

- The PAR form and instructions are available, at <http://standards.ieee.org/guides/par/index.html>. You can submit html/ text file. A PAR has a four-year life. Extensions are requested by submitting a “Target Extensions Request Form” at <http://standards.ieee.org/guides/par/extension.html>.
- Conventions used by NesCom and requirements for PAR submittal and PAR extension requests are posted at <http://standards.ieee.org/guides/par/nesconv99.html>
- Standards Home Page <http://standards.ieee.org/db/balloting/> can provide you; Balloting Status Reports and Sign-up to join Balloting Pool.
- Draft standards are submitted to the Standards Review Committee (RevCom) of the Standards Board. For RevCom conventions see <http://standards.ieee.org/board/rev/revconventions.html> For the Guide for Submittal of Proposed Standards see <http://standards.ieee.org/guides/revguide.html> Form for Submittal of proposed Standards, <http://standards.ieee.org/board/rev/submitform.doc> or <http://standards.ieee.org/board/rev/submitform.pdf> depending on your choice of a doc or pdf.
- For project Authorization Request (PAR) questions contact Jodi Haasz ([732-562-6367/j.haasz@ieee.org](mailto:732-562-6367/j.haasz@ieee.org)).
- For Editorial review of the draft and questions contact Yvette Ho Sang at 732-562-3814/[y.hosang@ieee.org](mailto:y.hosang@ieee.org)). It is best to do editorial review in early stage of standard development.
- For Balloting questions contact Stephen Kahofer ([732-562-5540/s.kahofer@ieee.org](mailto:732-562-5540/s.kahofer@ieee.org))
- For Review Committee Submittal contact David Ringle ([732-562-3806/d.ringle@ieee.org](mailto:732-562-3806/d.ringle@ieee.org)).

### 3.10.3 IEEE progress on internationalization of standards

- In 2000 IEEE established an agreement with Telecommunication Standardization Sector of International Telecommunication Union (ITU-T). This agreement will allow both organizations to reference other’s documents in their publications. Also, now working groups of both organizations can exchange information for development of standards. IEEE is in process of establishing a similar agreement with Radio Communication Sector of International Telecommunication Union (ITU-R).
- In globalization efforts and in cooperation with Region 7, first IEEE Standards National Committee has been established in Canada. Efforts are under way to establish similar committees in other countries.
- IEEE/PES Switchgear Committee conducted two panel sessions on standards harmonization with IEC.

- IEEE/PES/PS Relay Committee hosted several working groups of CIGRE at its regular meetings.
- IEEE/PES Substations Committee initiated a task force to resolve differences between IEC and IEEE standards for the purpose of developing a truly international HVDC valve test standard.
- **IEEE/ IEC Category D liaison established:**
  - a- IEEE/PES Switchgear Committee and IEC SC17A (High voltage switchgear and controlgear).
  - b- IEEE/PES Switchgear Committee and IEC SC17B (Low voltage switchgear and controlgear).
  - c- IEEE/PES Surge Protective Devices Committee and SC 37B WG1 (Gas Discharge Tube (GDT) and Metal Oxide Varistor).
  - d- IEEE/PES Surge Protective Devices Committee and SC 37B WG2 (Avalanche Breakdown Diode (ABD) and Thyristor Surge Suppressor (TSS) component matters).
- **IEEE/IEC Category D liaison in process:**
  - a- IEEE/PES/ED&PGC/Hydroelectric Power Subcommittee and IEC TC 4 (Hydraulic Turbines Technical Committee).
  - b- IEEE SCC 22 (Power Quality) and IEC SC77A (Low Frequency Phenomena).

## **HOW TO ESTABLISH A CATEGORY D LIAISON BETWEEN IEEE AND IEC?**

### **A- Request originating from IEEE**

- 1- IEEE Committee/Subcommittee Chair will write a letter to the secretary of IEC TC/SC requesting for a Category D liaison between the two the groups. A copy this letter will be sent to Staff Liaison.
- 2- Secretary of IEC TC/SC will discuss this request with relevant officers of IEC TC/SC.
- 3- Secretary of IEC TC/SC put the request on the agenda of the next meeting of IEC Committee of Action for approval.
- 4- After the approval is granted, Secretary of IEC TC/SC notifies IEEE (Staff Liaison) and requests the names of contacts from IEEE.
- 5- Staff Liaison will request IEEE Committee chair for names of the contact.
- 6- Staff Liaison will forward these names to the secretary of IEC TC/SC and a copy to Manager, Board Administration for IEEE-SA Board's notification.
- 7- All parties must send a copy of all future correspondence to Staff Liaison.

## **B- Request originating from IEC**

- 1- Staff Liaison will contact IEEE Committee Chair and forward the request for their response.
- 2- After discussion in the committee and finding interest, IEEE Committee Chair/designee will reply the request and send a copy to Secretary of IEC TC/SC to proceed with the process. A copy this letter will be sent to Staff Liaison.
- 3- The rest of the process is same as A-3 to A-7.

### **3.11 Standards subcommittee - T. A. Prevost**

#### **3.11.1 Standards and coordination activities**

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

#### **3.11.2 Documents submitted to the Standards Board**

See the status reports starting on page 82.

### **3.12 Subcommittee Activities - Subcommittee Chairs**

#### **3.12.1 Audible Sound and Vibration - Jeewan Puri**

No Report

#### **3.12.2 Bushings - F. E. Elliott**

No Report.

#### **3.12.3 Dielectric Tests - L. B. Wagenaar**

Bertrand Poulin has stated he no longer can dedicate the time as chair of the WG on Impulse Testing and a new chair will be selected in the near future.

Also Loren brought up the issue of the altitude correction factor. As everyone is aware the technical correctness of the altitude correction factor has been questioned and there is concern the standards board will not approve any documents containing this until the issue has been resolved. He also stated the issue not only covers transformer standards but documents in other areas such as switchgear and insulators or the thermal performance of equipment. He is sending this issue via Art Molden to the High Voltage Test Technics Committee (IEEE 4) for consideration. It is noted the IEC standards also use the same factors as the IEEE standards, therefore it will take time to get the issue resolved.

At this time the decision was to continue to send documents out for ballot and address any negatives that arise on this subject. It was noted that if a negative is received and not resolved the standard will be recirculated. If after the recirculation an appropriate number of affirmatives

still exist the standards board cannot turn down a document on technical merits. They only look at the procedural issues.

#### **3.12.4 Distribution Transformers – E. Smith**

No Report.

#### **3.12.5 Dry-Type Transformers - W. Patterson**

No report.

#### **3.12.6 HVDC Converter Transformers & Reactors - W. N. Kennedy/Richard Dudley**

As stated in the last adcom meeting the two standards covering smoothing reactors and converter transformers for HVDC (IEEE Std. 1277-2000 & C57.129-1999) have been published and are now being used in HVDC projects in progress. As you know these types of projects do not come along too often and therefore the two year life of these documents will probably need to be extended to allow these project to progress and allow time for feedback, During this 2-4 year time frame, the subcommittee will focus on assessing future needs and refinements for the two documents.

#### **3.12.7 Instrument Transformers - J. E. Smith**

No report.

#### **3.12.8 Insulating Fluids - F. J. Gryzkiewicz**

No report.

#### **3.12.9 Insulation Life – D. W. Platts**

No Report.

#### **3.12.10 Performance Characteristics - D. J. Fallon**

PCS will probably be setting up a WG to revise IEEE 32 as no one is working on it. In the past C62 had worked on it. Don will work with Tom Prevost to get responsibility for the document transferred to PCS.

Chuck Murray has new e-mail address which is [chrme@edge.net](mailto:chrme@edge.net).

#### **3.12.11 Power Transformers - E.G. Hager**

No Report

### **3.12.12 Underground Transformers and Network Protectors – C. Niemann**

No Report

### **3.12.13 Meetings & Planning - Greg Anderson**

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

### **3.13 Old Business**

Transfer of IEEE 32 to the PCS subcommittee – See Don Fallon’s report in 3.12.10

Discussion of the matter of outside parties wanting to obtain electronic copies of the invitation list of the committee. Greg has been approached several times about getting this information and has up to this point resisted. After much discussion it was decided we would not give out electronic copies of the list, but still continue to send out paper copies of the list with minutes. Also Greg brought up the point a “Reflector Service” had been set up with IEEE which will allow persons to send out mass e-mails (for non-commercial needs) when needed without having to have the e-mail list. The service is voluntary with users required to sign up for it but it provides an anonymous way for e-mails to be sent out.

Revision of the O&P manual will need to be done by the end of the year.

Peter Balma commented he has not received many comments from his presentation he made at the Niagara Falls ADCOM meeting. He will continue to push the items he described in his presentation.

### **3.14 New Business**

No new business was presented.

### **3.15 Adjournment**

Bipin adjourned the meeting at 5:20 p.m.

Respectfully submitted,

K. S. Hanus, Secretary

**IEEE/PES Transformers Committee Meeting Locations**

<b><u>Year</u></b>	<b><u>Spring</u></b>	<b><u>Fall</u></b>	<b><u>Committee Chair</u></b>
2002	Vancouver, BC, Canada	Oklahoma City, OK	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

#### **4.0 Editor's Report – M. Christini**

I'd like to give a brief summary of the technical paper review activities since the Niagara Falls meeting, as well as take this opportunity to issue an invitation to each of you.

As many of you know, the review of all IEEE papers dealing with transformers is assigned to the IEEE Transformers Committee. Potential papers are divided into two categories: Proceedings Papers and Transactions Papers. The Vice-Chairman of the Transformers Committee serves as editor for all proceedings papers while I presently serve as editor for all Transactions Papers. Transactions papers are required to be technically innovative, visionary, and should advance the state of the industry. Authoritative papers giving a succinct account of an entire field may also be accepted. Commercial papers, without sufficient technical detail and which only emphasize a company's capabilities, must be rejected.

Since January of this year, I have received a total of 24 papers. At this time, 4 reviews have been completed and 12 are underway, thanks to 40 different reviewers. Reviewers are currently needed for 8 new papers dealing with the following topics: fault analysis, harmonics, transformer connections, oil analysis, symmetrical component modeling, autotransformer design, core hysteresis modeling, and thermal overloading. For each paper, 4 reviewers are needed.

The review process requires that each reviewer complete 2 tasks which should take no more than 1 or 2 hours:

1. Each reviewer must fill out a "check box" review form that essentially recommends OR rejects a paper.
2. Each reviewer must prepare a short statement (a few paragraphs long) supporting this position. This statement is given anonymously to the authors of the paper.

I would like to invite and encourage each of you to review Transaction Papers. Please note that you do not need to be a member of the Transformer Committee to be a reviewer. I am preparing a pool of reviewers by specialty and would welcome any of you to join this list. As a participant in the Transformers Committee, you are expected to help with this effort whenever possible.

In closing, the IEEE Power Engineering Society has an obligation to provide papers of the highest professional quality for permanent reference value. Being a reviewer is an opportunity for each of you to help guide the advancement of the transformer industry. This will help you to remain abreast with the latest technical developments in the field, and may even allow you to be the first to see your competitors latest innovations.

## **5.0 Vice Chair's Report – H. J. Sim**

The vice chair covered the main points of his report shown in full length below.

### **5.1 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 2001 Winter Meeting in Columbus, OH on January 28 – February 1, 2001.

#### **5.1.1 Technical sessions**

Here are the high points of the discussions held and the report presented at the meeting:

Power Engineering Review will continue to publish Technical Committee promotional articles. The emphasis should be on present and future activities. The length of the article is at the discretion of the author. It may include: technical information, announcement of new working groups and task forces, membership information, and recruitment's for new members. Each committee will submit their material by their due date as scheduled.

Professor J. Jardini, General Chair, Transmission and Distribution Conference – Latin America 2002 gave a short presentation on the upcoming meeting to be held in Sao Paulo, Brazil, March 18-22, 2002. He said that costs to attend this conference were comparable to those conferences held in the United States – ex. Airfare \$1000, Hotel \$100. He included in his presentation a description of the technical program and exhibitions that are planned. Professor Jardini ended his presentation with a request for corporate support of the meeting.

Web site: [www.ieee.org.br/t-d2002lamerica](http://www.ieee.org.br/t-d2002lamerica)

John Paserba, TPC – Winter Meeting presented the proposed theme and tracks for WM2002 as below.

**THEME;** Embracing the Power of Change

**TRACKS;**

**TRACK 1: POLICY AND MARKETS,** covering such topics as:

- The latest on RTOs and ITCs
- “The State of the Union” of ISOs
- One Year Later: Lessons Learned From the California Experience
- Re-Evaluation of the Restructuring Process
- Electric Power Market Design and Participant's Strategy In Terms of Market Segments (Energy Market, Ancillary Service Market and Transmission Markets) and Market Timelines (Spot Market, Forward Market and Bilateral Market)
- Pricing Strategies, including Bundled Services

- System Operation Under Reduced Generation Availability
- The Technical Ramifications Reverse Auctions
- Policies and Requirements for Wide Area Stability Control

**TRACK 2: EMERGING TECHNOLOGIES**, covering such topics as:

- Power Electronics Including Flexible AC Transmission (FACTS)
- Alternative Energy Sources
- Superconductivity
- Dispersed Generation
- Surge Protection with Distributed Generation

**TRACK 3: ROLE OF INFORMATION TECHNOLOGY AND OTHER RESOURCES IN THE FUTURE**, covering such topics as

- Communications
- Mobile Computing
- Software Tools to Reduce Complexities of Applications, Testing, and Analysis
- Transaction Management and Risk Management Software
- Wide Area Stability Control Integration and Applications
- Enterprise Integration
- Teaching and Mentoring for Young Engineers and Technicians

**TRACK 4: RELIABILITY AND STANDARDS**, covering such topics as:

- IEC Standard Efforts to Standardize Software Interfaces and Communications Protocols
- Power Quality Standards and Measurements
- Standards/Needs for Wide Area Stability Control
- Reliability of Cable Systems
- Reliability of Transmission Lines
- Reliability of Power System Special Protection Schemes
- Whole House Protection From Low Voltage Protectors
- Migration Concepts to Move Toward Non-Standard Instrument Transformers

Mel Olken, Susan Sacks, and Marie D'Alessio (All from PES Staff) presented some information on PES Technical paper, publications, and meetings. Highlights of this presentation are:

#### Transactions Papers

- Flightdeck software keeps track of all process and provide status of any paper.
- In 2000, a total of 823 papers sent for reviews and only 102 decisions have been made.
- Upgraded on-line services. (*Manuscript Central*)
- New reviewer recruitment. (200+ as of January 2001) Sign up if you wish to volunteer for this important process.

#### Proceedings Papers

- 2001 is the third year since PES started using this classification of papers.
- The format for 2001 Summer meeting and T&D Conference will change to electronic.

#### Author's Kit

- Updated regularly. Visit the PES website and get the latest kit.

A short "brain storming" session was held to identify additional ways to improve technical programs. The following ideas were presented:

- Ali Keyhani described a method of creating a personal conference proceedings prior to attending the meeting. This service is offered for the International Conference On Systems Sciences by IEEE Computer Society.
- Several comments were received on the lack of desire for poster sessions.
- Requests were made to notify TCPC's of newly accepted transactions papers so that these papers could be considered for future technical programs.
- A proposal to revise the meeting structure to include one "all-in-one" poster session in the evening that did not conflict with any other event. A meal could be served that would encourage attendance. This suggestion receive a large number of positive comments.
- A technology fair, similar to something that EPRI conducts at their meetings, was suggested.
- Presentations similar to those presented at CIGRE meetings was also suggested.

### **5.1.2 Organization and Procedures Committee**

#### **5.1.2.1 Technical Committee Activity Reports**

No major discussion during the individual TC report.

### **5.1.2.2 Revision of the Technical Council Organization and Procedures Manual**

Our committee O&P Manual has been updated and distributed based on the current revision of the TC O&P Manual in November 2000.

### **5.1.2.3 Two new Committees**

We reviewed proposals to form two new committees with the following scopes and approved both of them.

#### **Scope for Emerging Technologies Committee**

Treatment of all matters in which the dominant factor is the research, development and application of emerging technologies for the Power Industry. In this context, conduct various symposia related to such matters. Initiate Standards, Guides or Recommended Practices as appropriate. Be attentive as to inclusion of additional technologies into the scope. Act as a focusing entity to assure complete coverage of all subjects within PES purview. Act as coordinating and consolidating body with other PES Committees, IEEE Societies or recognized International Bodies as they may have a particular interest in the matters. Actively seek a permanent organizational home for an area selected for development by the Committee once complete coverage is assured and coordination links to other areas defined.

By its very nature the scope must be flexible as to topics. Included at the present is treatment of the following:

- ❖ Power Electronics including Flexible AC Transmission (FACTS)
- ❖ Alternative Energy Sources (Wind, photovoltaic, etc.)
- ❖ Power system Applications Utilizing Superconductivity
- ❖ Dispersed Generation
- ❖ Power Quality Measurements and Standards

#### **Scope for Energy Policy and Markets Committee**

Treatment of all matters in which the dominant factor is the commercial aspects of the Electric Power Industry. Conduct symposia as appropriate related to such matters. Act as the PES coordinating body with regulatory agencies, reliability organizations, generating companies, regional transmission organizations, independent systems operators, trade associations, other professional societies, and IEEE USA as they may have a particular interest in these matters. Maintain a high level of cognizance of emerging developments so as to be able to speak knowledgeably and authoritatively when required.

- ❖ Utility Deregulation/Restructuring

- ❖ Siting of Electrical Infrastructure
- ❖ Mergers and Acquisitions
- ❖ Energy Policy
- ❖ Energy Efficiency
- ❖ Tariff Issues
- ❖ Retail Access
- ❖ Bundled Services
- ❖ Productivity
- ❖ System Reliability
- ❖ Information Technologies
- ❖ Electromagnetic Fields

## **5.2 Technical Paper Reviews**

### **5.2.1 Technical Paper Review Summary**

Our committee's editor Mark Christini reported the activity of his first three months on the job. We received 13 transaction papers and review for 12 of them are under way and 1 is complete.

### **5.2.2 Technical Paper Session at 2001 Summer Meeting**

Two transformer sessions are planned for the Vancouver, BC meeting, July 15 – 19, 2001. There are ten proceedings papers.

### **5.2.3 Technical Paper Session at PES T&D Conference**

We will have two paper sessions for about 10 proceedings papers and one panel session on "Coating radiators for corrosion resistance: Galvanized v.s. Painted" during the IEEE/PES T&D Conference in Atlanta, GA, October 28 – November 2, 2001.

Respectfully submitted,

H.J.Sim, Vice Chair

## **6.0 Transformer Standards - T. A. Prevost**

The standards subcommittee met on Wednesday, April 11 2001 with 11 members and 21 guests in attendance. Following introductions the minutes from the October 17<sup>th</sup>, 2000 meeting in Niagara Falls were approved as written.

### **6.1 Chairs Remarks:**

The chairman discussed the advantages of having transformer committee members get an IEEE alias for their e-mail. This would be a point of direction for IEEE e-mail to be routed to the subscriber. The advantage is that a change of e-mail address would be transparent. The url for obtaining an IEEE alias is:

<http://elecomm.ieee.org/personal-alias.shtml>

We also discussed the use of e-mail reflectors, which can also be obtained through IEEE. A reflector is a list of names, which can be compiled into one list. A person sending an e-mail to say the transformer committee membership need only to send to the reflector. The receiver would only see the reflector site in his e-mail, not the entire membership list. A reminder- This is not to be used for commercial purposes.

Reflector sites can also be set up for working groups. IF anyone is interested in obtaining a reflector site for their working group they should contact George Vaillencourt. If you would like to subscribe to the transformer committee reflector you can add your e-mail address through the transformer committee web page at <http://www.transformerscommittee.org>

The chairman also discussed the status of electronic balloting. Last year we decided to try a test case with PC57.12.59 "Guide for dry-type transformer through-fault current duration". This standard project is in the balloting process and we have received no feedback of problems. The invitation to ballot was done through the mail. If someone wanted to participate on the ballot they were required to return the invitation with their correct e-mail address on the form. IEEE has gone to electronic invitations. This could cause a problem if the ballot pool database is not accurate. To do this the next transformer committee ballot, which will be PC57.12.01, will include a letter with the invitation requesting that the invitation be returned even if that individual does not want to participate on the ballot with their up to date e-mail address. In this way we can start with an accurate ballot pool for future electronic invitations to ballot. Of course the use of IEEE aliases for e-mail addresses would simplify this.

### **6.2 Old business:**

C57.12.00 and C57.12.90                      Subhash Tuli

Both C57.12.00 and 12.90 will be sent out for ballot in July of this year. Subhash has several proposals for revisions to the documents and expects more from the various working groups, which oversee these standards in the subcommittees. This keeps us on our planned two-year cycle. A suggestion was made to Subhash to highlight any changes made within the document to assist the reviewer of the document. We discussed the issue of altitude correction. Loren Wagenaar indicated that he is looking into this and will contact IEEE 4.

C57.12.70 “Terminal markings and connections for distribution and power transformers” This standard has been revised and approved. It should be published this year.

C57.12.80 “Terminology for power & distribution transformers” This standard is in the revision process. A recirculation ballot has been completed with two negatives still outstanding. These negatives involve definitions for insulating fluids. Tom Traub is working to resolve this.

TF Guide for Metrification of Transformer Standards - Dudley Galloway

A draft of this guide was circulated to task force members late last year. Several comments were returned and these are being incorporated into the draft. The task force did not meet at this meeting. It is expected that the guide will be completed prior to the next meeting in Orlando. Naeem Ahmad, our staff liaison, suggested that the task force contact Mr. Bruce Barrows, the chairman of SCC14, for comments as well. His e-mail address is: [b.barrows@erols.com](mailto:b.barrows@erols.com)

### **6.3 New Business:**

“Phonebook” of transformer standards – Peter Balma asked when the phonebook will be revised and distributed and if he can get it on CD-ROM. Naeem replied that it cannot be obtained on CD-ROM .

Terry deCourcelle from IEEE standards department will check on this and the publication status and inform the chairman.

Status of C57.21 - Don Fallon requested that Naeem inform him of the status of C57.21 reaffirmation.

C57.12.90 & PC57.133 Short Circuit Guide - Subhash inquired as to whether he should continue with C57.12.90 as is without the short circuit guide, which was removed from 12.90 and started as a stand-alone guide. The chairman updated the group on the status of PC57.133. This draft guide is in the ballot process. It is hoped that the guide will be approved this year and published shortly after.

The meeting adjourned at 3:54 PM

## **7.0 Recognition and awards – J. W. Matthews**

### **7.1 Certificates of appreciation**

Transformers Committee Certificates of Appreciation have been obtained for the following persons:

<u>Name</u>	<u>Service Rendered</u>
Ernst Hanique	Amsterdam Meeting Host, April 2001
Linden W. Pierce	Chair, Insulation Life Subcommittee
Pritpal Singh	Chair, Working Group on Performance Characteristics and Dimensions for Outdoor Apparatus Bushings
Robert C. Degeneff	Technical Editor, IEEE/PES Transformers Committee

All of these awards, except for Linden Pierce's, will be presented at the main Committee meeting on April 12, 2001. Linden's award will be presented at the Committee meeting in Orlando, FL, USA.

### **7.2 Nominations for IEEE, PES, and Technical Council awards**

Jim Harlow has prepared documentation to nominate the tutorial paper "Sound Level Measurements in Transformers" by Jeewan Puri, Jan Declercq and Wim Van der Veken for the IEEE Donald G. Fink Prize Award. Each year the PES has the opportunity to nominate a paper for the this very prestigious award at the IEEE level (not PES) for the "most outstanding survey, review or tutorial paper .....".

A chart of the PES and IEEE awards available to PES Technical Committees is attached.

### **7.3 IEEE Standards Association working group chair awards**

I have received several inquiries regarding Working Group Chair Awards recently. The following excerpt from the IEEE Standards Association Operations Manual should help explain how this Award is presented. Please pass this information to all Working Group Chairs. Note that the Awards Subcommittee Chair is not involved with this presentation.

#### **“5.2.1.2 Working Group Chair Award**

This award, acknowledging important contributors to the development of a standard, is presented to the chair or co-chairs and may be presented to the designated vice chair or technical editor of the working group for a standard, and/or the special editor of a collection. The award is issued automatically upon publication of the document and consists of a laminated wooden plaque displaying the cover of the standard and the name of the person.”

**PES TECHNICAL COMMITTEE AWARDS**

AWARD	NOMINATION DEADLINE	NOMINATION SENT TO:
I. PES Prize Paper Award	October 25	Ed Guro
II. (a) PES Working Group Award - <i>Technical Report</i> (b) PES Working Group Award - <i>Standard or Guide</i>	October 25  October 25	Ed Guro  Ed Guro
III. "High Interest" Paper to be published in <i>PES Review</i>	October 25	Noel Schulz
IV. Alfred Noble Intersociety Award	October 25	Noel Schulz
V. Technical Committee Prize Paper Award Recipient	November 1	Noel Schulz
VI. Technical Committee Distinguished Service Award Recipient	November 1	Noel Schulz
VII. Technical Committee Working Group Recognition Award	November 1	Noel Schulz
VIII. IEEE Prize Paper Awards - (a) <i>W. R. G. Baker</i> (b) <i>Donald G. Fink</i> (c) <i>Browder J. Thompson</i>	April 1	Noel Schulz

PES Awards Committee Chair	Technical Council Awards Chair
Ed Guro Pennsylvania Power & Light Co. Two North Ninth St., Genn4 Allentown, PA 18101 Phone: (610) 774-4550 Fax: (610) 774-4116 Email: <a href="mailto:eaguro@pplweb.com">eaguro@pplweb.com</a>	Dr. Noel Schulz Michigan Tech University 1400 Townsend Dr. ERC 729 Houghton, MI 49931-1295 Phone: (906) 487-2869 Fax: (906) 487-2949 Email: <a href="mailto:n.schulz@ieee.org">n.schulz@ieee.org</a>

## **8.0 Meeting Planning Subcommittee -- G. W. Anderson**

The Meetings Planning SC holds an open meeting at each TC meeting to plan future meetings and assist future hosts by education and mixing of ideas and lessons-learned. The meeting is attended by at least the SC Chair, the present meeting host, future hosts, and hosts from past meetings. Others interested in hosting a future meeting, or assisting with meeting planning are encouraged to attend.

The Meeting Planning Subcommittee meeting began at 1:30 p.m., Wednesday, April 11, 2001 in the Hilton Amsterdam Hotel. Fifteen (15) people were in attendance. Greg Anderson, SC Chair facilitated. The meeting began with introductions by the attendees.

### **8.1 Committee finances**

Committee funds are presently (as of February 1) \$18,213.08. It is expected that approximately \$6,500 of these funds will be used to subsidize the expenses (losses) of the Amsterdam meeting.

### **8.2 Past & present meetings**

#### **8.2.1 Past meeting - Niagara Falls, Ontario, Canada**

Roger Hayes and the VA-Tech/FPT Host Team did an excellent job planning and implementing the previous meeting. Special thanks go to Ms. Sherry Baker and her team at Events Extraordinaire, a local events planning company, for their assistance to the Host Team. Roger empathized that Sherry's team provided notable value to the event and allowed him and others at FTP to "concentrate on being a host" and selling transformers. Roger encouraged future meeting hosts to consider using a professional local meeting planner.

#### **8.2.2 Present meeting - Amsterdam, The Netherlands**

Ernst Hanique and his SMIT Host Team were complimented on a very worthwhile and productive meeting despite the overseas location. The attendance was good despite the lack of attendance of those working on Distribution Subcommittee activities. Ernst summarized preliminary attendance counts (see the attachment at the end of the minutes). The facilities of the Hilton Amsterdam were excellent. SMIT hosted a relaxing and scenic trip to Nijmegen on a train pulled by a classic steam-train for a tour of their factory and dinner in a medieval castle. Companion tours included excursion to Province of West Friesland and an excursion to Gouda & Schoonhoven. The speaker at the Tuesday luncheon was Mr. Menno de Vries from KEMA Laboratories. The Wednesday evening event consisted of a dinner cruise on the luxury saloon steamer, "Prins van Oranje". After the meeting KEMA Laboratories hosted a tour of their test facilities in Arnhem.

### **8.3 Future meetings**

### **8.3.1 Summary**

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

- October 14-18, 2001 -- Orlando, Florida ... Joe Watson (FPC) and Jim Hudock (Ohio Transformer)
- April 14-18, 2002 -- Vancouver, B.C. ... Mike Lau (BC Hydro)
- October 20-24, 2002 -- Oklahoma City, Oklahoma ... Joe Garza (Southwest Electric)
- Spring 2003 -- open for US meeting; contact Greg Anderson for if interested in hosting a meeting
- Fall 2003 -- open for US meeting

Possible locations for future meetings include: New York City, Minneapolis, Biloxi, Montreal, Charlotte/Raleigh, and Edinburgh, Scotland (in 2005 or 2006) to name a few.

### **8.3.2 Upcoming meeting -- Orlando, Florida**

Joe Watson has reserved meeting rooms and 275 guests rooms at the Omni Rosen Hotel (also known as the Rosen Center) in Orlando, Florida. Room rate will be US\$165 (without taxes), single or double occupancy. The meeting will be the first to incorporate the "Sunday through Thursday" schedule. The schedule will consist of individual "break-out" meetings all day Monday, Tuesday, and Wednesday, with the "full Committee meeting on Thursday morning" (see more details later). Ohio Transformers will host a tour of their Bradenton Plant. Although additional planning is in progress, this meeting will be promoted as a family meeting and attendees are encouraged to bring their children. Joe Watson can be reached at (561) 691-2206 or [joe\\_watson@fpl.com](mailto:joe_watson@fpl.com) and Jim Hudock can be reached at (407) 854-8130 or [jhudock@ohiotransformer.com](mailto:jhudock@ohiotransformer.com).

### **8.3.3 Upcoming meeting -- Vancouver, B.C.**

Meeting rooms and 250 guest rooms have been reserved at the Westin Bayshore Resort & Marina adjacent to Stanley Park. Room rate will be CAN\$180 (approx. US\$130, without taxes), single or double occupancy. Mike Lau can be reached at (604) 528-3201 or [mike.lau@bchydro.bc.ca](mailto:mike.lau@bchydro.bc.ca).

### **8.3.4 Upcoming meeting -- Oklahoma City, Oklahoma**

Joe Garza presented a brief informative slide presentation on Oklahoma City and what it can offer for a meeting facilities and activities. Joe is working closing with the local visitors & conference bureau and is close to choosing a host hotel.

## **8.4 New business**

### **8.4.1 TC Web-Page**

Continued thanks to Georges Vaillancourt for maintaining the web-site. The site contains complete minutes from recent past meetings and information about upcoming meetings.

Greg has developed a useful "Industry Calendar", also available on the TC web-site, that lists upcoming "transformer-related meetings, through year 2010. This calendar is helpful in planning future Committee meetings and avoiding conflicting meeting dates.

A new working group called "WG Web-page Development" will be developed and will have its first meeting in Orlando. The new WG will further develop the TC web-site, encourage productive use of the site (bulletin boards, etc), determine "web content", and develop procedures for adding material to the web-site. Georges has volunteered to co-chair the WG. A representative from each subcommittee is encouraged to attend the meeting. Additionally, a "WG for Educational Development" is being investigated to promote "educational content" and coordinate "presentations and tutorials. The proposed WG would attempt to certify certain tutorials for continuing education units (CEUs) for professional development.

#### **8.4.2 Meeting schedule**

Again, the new longer meeting schedule was discussed. The new schedule will begin at the Orlando meeting and will begin Sunday evening with the usual Hospitality Reception. Individual "break-out meetings" will begin on Monday morning and will continue through Wednesday afternoon. The "Full Committee Meeting" will be Thursday morning. The following criteria will be used for the longer schedule.

- Only one timeslot for each SC meeting.
- No more than two timeslots for each WG or TC activity.
- A target maximum of 5-6 meetings per timeslot.

Greg has already started developing the "Orlando Schedule" and has begun working with SC Chairs on desired meeting order. The longer schedule will allow a couple of time slots dedicated specifically for educational content (tutorials and presentations).

#### **8.4.3 E-mail reflector service**

A new "e-mail reflector service" has been created to help disseminate non-commercial Committee information. Advance information about future meetings will only be distributed with this service. Therefore, to avoid missing helpful information, everyone should subscribe to the service. A link to subscribe to the service is provided in the web-site.

Additionally, it is encouraged that everyone create an "e-mail alias" address to help eliminate confusion and allow people to maintain proper contact if they switch employers. An alias can be created by accessing the IEEE website ([www.ieee.org](http://www.ieee.org)) and typing "alias" into the search window or by directly accessing the web-page at <http://elecomm.ieee.org/personal-alias.html>.

#### **8.4.4 Mailing of committee meeting minutes**

It was decided at the Administrative Subcommittee meeting at the Fall 2000 meeting that meeting minutes would now be "snail-mailed" only to:

- Committee Members
- Attendees of that associated meeting

This new mailing policy will significantly reduce the cost to print and mailing minutes. We hope, with the increased use of the web-site, to someday stop mailing the traditional paper document and allowing interested parties to download the minutes from the web or perhaps order the document on CD.

#### **8.4.5 Miscellaneous**

Additional topics were discussed:

Create an "anniversary CD" that will contain an assembly of documents and meeting minutes from the past 5-10 years. The CD could perhaps be presented to all Committee Members and made available to meeting guests and other interested individuals.

Continue to improve the registration process. Perhaps automatically confirm that those who register as IEEE members are indeed due-paying members and confirm life and emeritus memberships. Perhaps add the ability to make hotel reservations on-line while registering for a meeting.

Coordinating and consolidating databases. Presently there are no less than 5 databases (TC membership list maintained by SC Secretary), each meeting registration list, ballot list, SC & WG membership lists maintained by chairs, and the IEEE membership list (self-maintainable).

Sell "products" such as meeting standards (C57 Collection, etc) at upcoming meetings. Develop a "golf-type" shirt with a Committee logo and sell at the meetings.

Include IEEE membership and Committee membership applications in invitation packages mailed before each meeting or welcome packages distributed during each meeting.

Investigate IEEE Conference Management Services providing additional services such as maintaining our membership list, tracking meeting attendance, including attendance at large break-out meetings perhaps using bar-codes on name-badges.

It was also noted that IEEE has a "full-service" travel agency that can provide low airfares, car rental, etc. IEEE Global Travel Services can be reached at (800) 879-4333 or at [www.ieetravelonline.org](http://www.ieetravelonline.org).

The meeting was adjourned.

## **9.0 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).

### **9.1 Dry-Type Transformers - W. F. Patterson, Chair**

#### **9.1.1 Introductions and Signing of Attendance Forms - W. Patterson**

Meeting began at 11:00 am in Ballroom A of the Hilton Hotel – Amsterdam. There were 14 members and 6 guests present.

#### **9.1.2 Approval of Minutes - W. Patterson**

The minutes of the Niagara Falls meeting were approved as written

#### **9.1.3 Reports of the Working Groups**

##### **9.1.3.1 WG Dry Type Thru-fault Current C57.12.59 - P. Payne**

No meeting was held at the session. Paulette Payne reported on the status of the ballot.

About 145 ballots sent out. There was 1 short of the 75% return. Extended 1 week and was then valid. There was an error in one of the figure may require a re-ballot. The chair will prepare a report to the WG on the disposition.

The members had no problems with the e-ballot process. The question was asked if there was any problem with e-mail attachments. None were noted at this time by the WG Chair.

Recommendation for IEEE on future eBallots:

1. Could electronic ballot automatically trigger an e-mail reminder to non-responders?
2. Could repeated non-responders to ballots be automatically removed from the balloting pool?

##### **9.1.3.2 WG Dry Type General Requirements C57.12.01 - J. Sullivan**

The meeting of C57.12.01 was held at 3:00 PM on April 10, 2001 in the Orange room of the Hilton Amsterdam hotel.

After introductions of members and guests present, the minutes of the Niagara Falls meeting were approved.

Eleven members and three guests were present.

The first order of business was presented. The chairman, Mr. Sullivan reported that the revised

standard had been submitted to IEEE Headquarters for balloting. The ballot will be processed electronically.

The Chairman reported that one table was added, IEC cooling classes were added to Table 2. The rest of the tables were renumbered.

A suggestion was made by Anthony Jonnatti to add an annex to this standard that would provide both metric and English equivalents. This table would apply to the units in this standard only. A motion was made presented to the group and approved. An attempt will be made to add the annex to this revision. If it cannot be added at this time, it will be placed in the next revision. Mike Mitelman will submit a list of equivalent units for discussion. Wes Patterson will contribute.

The chairman asked for any old business. None was presented.

With no new business the meeting was adjourned at 3:35 PM.

### **9.1.3.3 WG Dry Type Reactors - R. Dudley**

On April 10, 2001 the Dry Type Reactor W.G. met in the Orange 4/6 Meeting Room of the Amsterdam Hilton with 8 members and 5 guests present.

The following are the highlights of the meeting.

1. The attendance list was circulated.
2. The minutes of the Niagara Falls meeting were approved.
3. The recirculation ballot for IEEE C57.16 was reviewed. Per the latest information from IEEE the ballot was successful re the required responders. The only possible issue involves the altitude correction for dielectric strength. The issue was first raised in the Switchgear Committee. The Switchgear Committee are considering an approach where the correction is cumulative from sea level but the cumulative correction is only first applied after 1000 meters vs. the current practice where the correction starts at and is only applied after 1000 meters. After a great deal of discussion the consensus was that the current approach is valid since standard requirements are that equipment be capable of operation at altitudes up to 1000 meters. The implication is that the capability to operate up to altitudes of 1000 meters is built in and therefore no step correction is required at 1000 meters. Other comments included.
  - The standard service requirements in C57.16, C57.12 and other IEEE standards for transformers etc. have as a standard service requirement operation at altitudes < 1000 meters.
  - Peter Balma stated that in a survey he has made of switchgear standards the current altitude correction methodology for dielectric strength has been in place since the 1930's and 1940's.

- This issue of altitude correction for dielectric strength is on the agenda of the Dielectric Tests S.C. and will probably be passed to the W.G. responsible for IEEE Std. 4.

In summary the consensus of the Dry Type Reactor W.G. is that the altitude correction for dielectric strength should remain as is in C57.16 and other standards under the jurisdiction of the Transformers Committee until a recommendation is made by the Dielectric Tests S.C. Consideration should be given to the interpretation presented at the beginning of this highlight.

4. The first draft of an annex for C57.21 on thyristor-controlled reactors was discussed with a focus on components submitted by Pierre Riffon. Pierre's comments were supplied to W.G. members attending the W.G. meeting and will be supplied to all W.G. members when the minutes are mailed. The highlights are:
  - (i) A3.2: TCRs are split to limit di/dt.
  - (ii) A4.1: Editorial comment accepted.
  - (iii) A4.3: An overcurrent in the TCRs can also be caused by a misfiring of the thyristor valve.
  - (iv) A4.4: Text must be written for this section. Rated losses must be related to rated current and operating point. Lars Erik Juhlin will draft the text; including a separate definition for rated current (A2.3). Rated current, rated losses and operating point are related to system design and should be specified by the system designer. Pierre Riffon will produce a typical graph of current (fundamental plus harmonics) vs. firing angle.
  - (v) A5.1: The turn to turn test is one acceptable alternative to the lightning impulse test if the time to the first voltage crest is less than 3  $\mu$ sec.
  - (vi) A5.4.3: The reference to nominal inductance will be eliminated. The effective resistance will be measured at rated harmonic frequencies. The losses at harmonics will be obtained by measurement.
  - (vii) A5.4.4 and A.5.4.5: Context is okay based on changes to 5.1.
  - (viii) A5.5.1: The temperature rise test should be carried out at rated losses if they are the maximum losses. A definition of rated losses and rated current is required. Clamping structure losses should be included in the winding loss for the temperature rise test. It is important to determine the temperature rise of the reactor terminals during the temperature rise test.
  - (ix) A5.5.2: Definition of rated current is required.

- (x) A.5.6: Although sound level at the "fence line" may be important for an SVC installation this is a system design decision. The TCR specification should state an acceptable value for the reactor. Information on sound power measurement should be included based on that in the SMR std.; IEEE 1297. A statement should be added that sound intensity is an acceptable measurement methodology. Sound should be measured at a number of harmonic currents to demonstrate the validity of the manufacturers calculation methodology.
- (xi) A7.1: PR comment accepted.
- (xii) A8.1: PR comment accepted.

The Chairman stated that he would prepare Draft 2 of the ANNEX on TCRs based on inputs discussed and circulate it prior to the next W.G. meeting. The meeting adjourned at 10:45 a.m.

#### **9.1.3.4 WG Dry Type Test Code C57.12.91 - D. Barnard**

The new standard has been published. The WG discussed the following. A-weighted sound levels to follow the liquid-filled WG disposition. Cooling Class designations to use the IEC designations bringing the document in alignment with C57.21.01. These changes will be included in the next revision.

A current issue of C57.123 will be sent to the WG for review.

The working group met at the appointed time with 8 members and 4 guests present. After introductions the Chairman asked for comments and/or corrections to the minutes from the previous meeting in Niagara Falls, Ontario, Canada, October 17, 2000. There being no comments a motion was made and seconded to accept the minutes as written. The motioned passed.

#### **Old business**

1. The Chairman announced that the IEEE Standards Board had approved the standard for publication with the date of 2001. A copy of the standard was shown to the working group. It will have a life of 5 years at which time it must be revised or reaffirmed.
2. Jeewan Puri withdrew his negative ballot concerning average A-weighted sound level measurements as long as the working group agreed to consider his recommended changes prior to the next revision. Mr. Puri was not present at this meeting. The working group will consider adopting the test methods of C57.12.90, when it is published.
3. Subhash Tuli comments on adopting IEC cooling class designations will be addressed in the next revision. S. Tuli was not present at the meeting.
4. Wayne Hansen's recommended changes for clause 10.8 on insulation power factor testing will be addressed in the next revision of the standard. Wayne promised to provide wording for the change. W. Hansen was not present at the meeting.

5. Nigel McQuin's comments on resistance measurements, dielectric tests and temperature testing will be addressed in the next revision of the standard. N. McQuin will provide wording for the proposed changes. N. McQuin was absent from the meeting.

#### New business

1. C57.123/D1.7 is a guide for transformer loss measurements. The chairman will send copies to members via email for the purpose of reviewing the document. There may be some changes to be recommended to the test code so insure no conflicts exist between the two documents. Members were asked to read the draft and be prepared to comment at the next meeting.

A motion was made, seconded and approved to adjourn the meeting at 8:30 am.

#### **9.1.3.5 WG Thermal Evaluation C57.12.56,C57.12.60 - R. Provost**

This WG meeting was cancelled. At the Orlando Meeting the WG will discuss the combination of the 2 standards.

Bill Simpson indicated during his report on IEC TC-98 that this was an excellent opportunity to introduce as an IEC standard – probably with IEC TC-98.

#### **9.1.4 Liaison Report IEC TC 98 - R.W.Simpson**

IEC TC 98 Bill Simpson gave a report on activities. Three standards have been published IEC 60505 Evaluation and Qualification of Electrical Insulation Systems, IEC 61857-Procedures for Thermal Evaluation – Part 21: Specific Requirements for General Purpose Model – Wire Wound Applications, and IEC 61858 Thermal Evaluation of Modifications to an Established Wire-Wound EIS. Bill proposes use of C57.12.56 and C57.12.60 as models for IEC document on test procedures. IEC 62114 Thermal Classification of EIS will be circulated as an FDIS.

#### **9.1.5 Chairman's Remarks and Announcements - W. Patterson**

- Future Meetings

F01	Orlando	Oct 14-18
S02	Vancouver	Apr 14-18
F02	Oklahoma City	Oct 20 –24 or Nov 03 – 07
- Problem: participation of users
  - Need more users
  - Increase use of tutorials with the purpose of educating to improve user participation.
  - Reduce number of PES meetings
- Need Technical Papers for Winter Meeting 2002
  - Contact Jim Harlow
  - see PES web page for rules / dates
- Tom Prevost (Jody Hass of IEEE) needs to know what standards are used internationally and where

- List of IEEE standards adapted by IEC
- List of what countries are using IEEE standards
- Electronic balloting – will move to this in the future IEEE members need to keep their personal info updated
  - Maintenance of Personal Data on IEEE
- These services are only available to IEEE members
- Go to [www.ieee.org](http://www.ieee.org)
- Follow link [Change Contact Info.](http://www.ieee.org/membership/coa.html) [http://www.ieee.org/membership/coa.html] to update personal data
- Follow link [Personal Email Alias](http://elecomm.ieee.org/personal-aliases.shtml) [http://elecomm.ieee.org/personal-aliases.shtml] to setup email alias
  - This can also be done from the “Change Contact Info” link
- ANSI Committee documents brought into IEEE for maintenance, but we do not have authority to publish as copyright problems have not been resolved. The standards have not updated since 1994; we can work on them while the issue is being resolved.
- C57.12.50 Requirements for Dry Type Distribution Transformers < 500 kva
- C57.12.51 Requirements for Dry Type Distribution Transformers > 500 kva
- C57.12.52 Requirements for Sealed Dry Distribution Transformers > 500 kva
- C57.12.55 Conformance Standard for Dry Type Transformers used in Unit Installations

#### **9.1.6 New Business - W. Patterson**

- C57.12.58 Guide for Conducting Transient Voltage Analysis of a Dry Type Transformer Coil
  - SC voted to reaffirm the document. Paulette Payne will manage the ballot.
- C57.124 Recommended Practice for the Detection of PD and the Measurement of Apparent Charge in Dry Type Transformers-
  - SC voted to reaffirm the document. Paulette Payne will manage the ballot.

#### **9.1.7 Adjournment - W. Patterson**

The meeting adjourned at 11:58 AM

## **9.2 Distribution Transformers - E. Smith, Chair**

**No report was given**

## **9.3 Dielectric Test Subcommittee - L.B. Wagenaar, Chair**

The Dielectric Test Subcommittee (DTSC) met on Wednesday, April 11, 2001, at 1:30 p.m., in Amsterdam, Netherlands at the Hilton Amsterdam Hotel, with 29 members and 33 guests present. Three of the guests requested membership on the Subcommittee they included, Tom Bassett, Eric Davis, and Alan Forrest.

### **9.3.1 Chair's Remarks**

After introduction of the attendees, the Chair reviewed some of the highlights of the Administrative Subcommittee meeting held on April 9, 2001. (See Section 4.0 of IEEE/PES Transformer Committee meeting minutes from the Amsterdam, Netherlands meeting for additional details of the Administrative Subcommittee meeting).

1. Starting at the October 14-18, 2001 meeting in Orlando, Florida, IEEE/PES Transformer Committee meeting will be 3 ½ days instead of the current 2 ½ days. The meeting will be held at the Rosen Centre Hotel, in Orlando, FL.
2. The Technical Committee is soliciting ideas for technical sessions at all the meetings. The method proposed is that the Working Group will develop the ideas for the technical sessions or seminars and present them at the Working Group meeting. If the technical session is good enough it will be presented to the entire Transformer Committee. The outstanding Technical Sessions will then be presented at the annual Power meeting.
3. Working Group Chairs can recommend 2-3 additional people from the Working Group who can receive a Certificate of Appreciation. These are individuals who make a significant contribution to the completion of a Standard or a Guide.
4. The Chair also emphasized the importance of including the member's e-mail address on the attendance rosters. This speeds the process of getting the members the subcommittee minutes and agenda. They should also make sure that their e-mails are updated on the main Transformer Committee list since ballots are now being sent electronically.

### **9.3.2 Working Group Reports**

#### **9.3.2.1 Working Group on Partial Discharge Tests in Transformers - J.W. Harley, Chair, reported by L. B. Wagenaar**

19 members and 46 guests attended the meeting. Attendees introduced themselves. Minutes of the previous meeting October 16, 2000 in Niagara Falls, Ontario, Canada were approved.

The letter ballot PAR C57.127 Trial Use Guide For the Detection of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers has been published. Copies are available through the IEEE.

Dirk Russwurm of HV Technologies, Inc. discussed the measurable characteristics of PD, the correlation of acoustic and electrical signals and the limitations of making these measurements for both field and factory applications.

Discussions continued on the Guide for the Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors. The Title, Table of Contents, and Section 11 Acoustic Activity Interpretation were reviewed.

### **9.3.2.2 Working Group on Revision of Low Frequency Tests - Mark Perkins, Chair**

The working group met on Tuesday, April 10 at 11:00 am, with 14 members and 20 guests present. The minutes of the last meeting were distributed to those present. 2 guests requested membership in the working group.

The working group business consisted of two presentations on advanced dielectric tests. The first was by Mark Perkins, on the dielectric response measurement for characterizing transformer insulation conditions. The dielectric response test is a measurement of the capacitance and dielectric loss or power factor vs. frequency. The setup for the test is the same as for the standard power factor test, and measurements are made at multiple frequencies between 10 mHz and 1000 Hz. The measured data is then analyzed by modeling the transformer insulation structure and fitting a calculated curve to the measured data points. The fitted curve gives the percent moisture in the cellulose and oil conductivity as two of the calculation parameters. Examples were shown demonstrating how the Dielectric Response test provides improved accuracy over other established methods for determining moisture in the cellulose. The second presentation was by Reto Fausch on the Recovery Voltage Method. The RVM is a dc test of the transformer insulation that is used to trend the relative moisture in the cellulose. Measurements are made by applying a dc voltage for a fixed time, then briefly shorting the specimen, and finally measuring the peak value of the voltage that builds up after removing the short. The test is then repeated to obtain a curve of the recovery voltage vs. the time of initial voltage application. The shape of this curve is analyzed to determine the relative moisture level in the cellulose insulation.

The industry is beginning to accept advanced dielectric tests as an important part of field predictive maintenance practice. There is a need for the tests to be done in the factory to provide baseline values for comparison purposes and to quantify the moisture in the cellulose insulation after the factory drying process. To prepare for this eventuality, it was recommended that we begin to work to include test requirements and procedures in C57.12.00 and C57.12.90.

This meeting adjourned at 12:20 PM.

### **9.3.2.3 Working Group on Revision of Transient Dielectric Tests - Bertrand Poulin, Chair (resigned) – reported by L. Wagenaar**

The Working Group on Transient Dielectric Tests met yesterday. Bertrand Poulin recently resigned as chairman of the working group, so Loren Wagenaar chaired the meeting in his place.

Pierre Riffon resubmitted his proposal for specifying the minimum energy capability of impulse generators. His previous proposal, submitted in 1998, had only one size for all kVA rating of transformers. The new proposal included five sizes for 3 phase ratings ranging from 15 kVA to

greater than 240 MVA . The proposed minimum kilo Joule (kJ) ratings of the generators ranged from 12.5 to 100 KJ, respectively. Discussion at the meeting was that 1) the general approach for improving the wave-shape tails was good 2) the KJ numbers may not be correct. The general discussion tended to agree that they may be too high 3) Same emphasis needs to be given in the guide to point out that generator setups will probably require parallel arrangements of the capacitor steps.

The remainder of the meeting was spent listing the priority topics within the working group. These are listed as:

1. Wave-shapes for full and chopped lightning impulse tests.
2. Digital impulse recorders. Transformers create “non-standard” mathematical waveforms and therefore require special wording to describe the waveforms. IEC has a considerable amount of material in the new impulse guide, and we may be able to use all or some of their wording.
3. Switching impulse valves seems to be incorrect for some entries of Table 5 of C57.12.00. This error appears to have occurred several revisions ago, and had been copied in subsequent revisions.

A new chair will be selected before the next meeting.

#### **9.3.2.4 Task Force on Liquid-Filled Transformers Dielectric Test Tables - Phil Hopkinson, Chair**

The Working Group on Dielectric Test Tables met at 4:30 pm on April 10 in Amsterdam. There were approximately (60) attendees, but only (21) signed the roster!!

The mission of this working group is to develop new proposed tables to replace tables 2 - 7 in C57.12.00.

The chairman reviewed comments and revisions of tables that have been produced to date. Maximum systems voltage has been added to supplement nominal system voltage. There was general support for this change and for the inclusion of alternate arrester settings and corresponding BIL levels.

The issue of harmonization came up, and we defined it as a condition in which the IEC and ANSI standards will not conflict with each other. They do not have to have identical wording. This issue was most important in resolving the separate tables and relationships between IEC and ANSI standards.

The next action will be to send out copies of our draft for survey ballot with in the Dielectric Test Subcommittee for comments.

The meeting adjourned at 6:00 PM.

The Subcommittee Chair commented that at 350kV BIL the switching impulse is not 83% of the BIL. This may have been changed in the standard by error several updates ago. This needs to be changed or some rational as to why the switching impulse is different at this BIL needs to be

developed. The Subcommittee Chair (L. B. Wagenaar) volunteered to review the old standards to see when this change occurred and if it was introduced by error.

P. Hopkinson commented that there had been discussions concerning the preferred versus the alternative BIL levels in the standard. Some attendees argued for increasing the preferred levels and some for reducing the levels. He is interested in comments that are received on this subject in the survey ballot.

### **9.3.4 Liaison Reports**

#### **9.3.4.1 Insulation Coordination – John Crouse**

(No report)

#### **9.3.4.2 Surge Protection Devices – Bob Degeneff**

(No Report)

#### **9.3.4.3 IEC TC14/WG24 – Loren Wagenaar**

There has not been a meeting of the Working Group since the October 2000 meeting. The next meeting will be held September 2001 in Milan, Italy. The Chair reported that he had received the latest IEC Impulse Guide. For those who are interested, copies of the Guide are available upon request

### **9.3.5 Old Business**

#### **9.3.5.1 IEEE - 4 Art Molden**

IEEE High Voltage Test Techniques (HVTT) meeting was taking place at the same time as the Subcommittee meeting and Art Molden was attending that meeting in Florida. No Report was available, an update will be made at the Orlando meeting in October.

#### **9.3.5.2 Phase to Ground Clearances – B. Chiu**

S. Tuli and Bill Chiu have been working on phase-to-ground clearances.

At the last Subcommittee meeting S. Tuli suggested that we develop a table comparing the NESC and the IEEE clearances for review of the membership. This table will also have line-to-ground clearances. B. Veitch suggested that we add the clearances from IEC 76-3 for a comparison. This maybe a little difficult because of differences in system voltages in IEC vs. IEEE. S. Tuli volunteered to complete this comparison and have it available for the October 2001 meeting in Orlando, FL.

### **9.3.6 New Business**

#### **9.3.6.1 Altitude Correction Factors**

##### Background:

The DTSC Chair addressed an issue that was raised during a ballot for Smoothing Reactors (1277). One of the Circuit Breaker Liaison members (Mr. Lambert) pointed out that the Altitude

Correction Factors in the Smoothing Reactor Document were incorrect and that the Altitude Correction Factors in all the current IEEE Standards are incorrect. He believes it is acceptable not to use any corrections up to 1000 m, but once an altitude of 1000m level is reached, the cumulative correction factor from sea level must be applied.

It was decided at the last meeting in Niagara Falls, Canada that this subject should be addressed by the High Voltage Test Technique (HVTT) Subcommittee of IEEE-4. Art Molden our Liaison representative to the HVTT Subcommittee will bring this subject up to the group this week in its meeting in Florida. It was decided that the HVTT should look at the altitude correction factors since they pertain to all apparatus that uses air as an insulator. The HVTT Subcommittee should make a coordinated decision on how to apply the altitude correction factor.

It was noted by Richard Dudley that there were discussions on this subject at both the Dry Type Reactor and Dry Type Transformer Subcommittee. It was pointed out that in the beginning of most of the transformer standards the standard operating conditions required that the equipment operate up to an altitude of 1000m. This implies that the equipment is capable of operating up to 1000m, if this is the case, the way the altitude correction factor is currently being used would be correct. Switchgear Standards from the 1940's were reviewed and the altitude correction factors were the same as they are today in those old documents. There have not been significant problems in applying the correction factors as they appear in today's IEEE standard.

The Subcommittee Chair recommended that we review the Transformer Standards to confirm that the standard operating condition of the equipment goes up to the 1000m level. If this is the case, we should convey this information to the HVTT to help in their decision. It was noted that the IEC currently uses the same altitude correction factors at IEEE.

### **9.3.6.2 Other Business**

Don Fallon had two items that come out of the Performance Characteristics Subcommittee pertaining to C57.12.00 that should be handled by the Dielectric Test Subcommittee.

1. Correction of Switching Surge levels
2. Current standards do not define the limits for partial discharge on Class 1 transformers.

These items need to be review by the appropriate Working Groups.

There being no new business the meeting was adjourned.

## **9.4 HVDC Converter Transformers & Smoothing Reactors S. C. - Richard Dudley**

The HVDC Converter Transformers & Smoothing Reactor S.C. met in the Orange 4/6 Room of the Hilton Amsterdam, on April 10, 2001 with 10 members and 5 guests present.

The following are the highlights.

1. The minutes of the Niagara Falls meeting were approved.
2. The attendance list was circulated.

3. It was suggested a liaison be established with the IEC W.G. responsible for the IEC converter transformer standard. Per Einar Purra the IEC converter transformer standard was published in Feb. 2001 and will be a 4 year trial use document.
4. Pierre Riffon provided input re HQ's experience with D.C. tests for HVDC converter transformers and oil immersed smoothing reactors. Attachments to be provided to S.C. members. Highlights and discussion points are as follows.
  - (i) The D.C. applied voltage test has worked out well and is also essentially the same as the test methodology in the IEC standard.
  - (ii) The polarity reversal test was "quite easy to use". However practice was to ground the d.c. supply during the reversal. This should be added to the test methodology.

In addition the test methodology in IEEE 1277 and IEEE C57.129 should be consistent re performance of the polarity reversal test. Specifically p.d. should be measured commencing immediately after voltage stabilization following the reversal; 1277 should be modified accordingly.
5. Lars-Erik Juhlin presented a CIGRE publication from ELECTRA; Dec. 1994, No. 157; "The Relationship Between Test and Service Stresses As A Function of Resistivity Ratio For HVDC Converter Transformers and Smoothing Reactors". Document to be provided to S.C. members. This document is the basis for portions of the test code in both IEEE 1277 and IEEE C57.129 and the IEC converter transformer standard. The bibliography of the IEEE standards should include reference to this document.
6. Einar Purra presented a comparison of the IEC and IEEE converter transformer standards. They are well harmonized. The summary prepared by Einar will be provided to S.C. members. Some highlights of discussions are:
  - (i) IEEE C57.129 Clause 6.10. Guaranteed losses should be more clearly defined; in both IEEE and IEC documents. No load losses are suitably defined but load losses are not.
  - (ii) IEEE C57.129 Clause 6.11. Titles of subclauses should refer to "test levels" to be consistent with the intent of the section. The definition of test levels should be separated from test method.
  - (iii) IEEE C57.129 Clause 7. This clause covers construction. IEC has no similar section.
  - (iv) IEEE C57.129 Clause 9.6.2.2. The method of determining losses in the IEEE document appears to be more accurate. Liaison is required on the issue with the IEC W.G. ANNEX A of C57.129 should be modified to include a typical example of determining losses of a converter transformer.
  - (v) IEEE C57.129 Clause 9.7.1. There are significant differences in the test methodology for performing the impulse test across the windings and to ground in the IEEE and IEC documents. Peter Heinzig presented a series of graphs

illustrating possible conditions of over testing of the converter transformer insulation system. Peter's presentation will be supplied to S.C. members. The IEEE methodology appears to be preferable to that of IEC but over testing is possible with either methodology.

- (vi) IEEE C57.129 Clause 10.2. The issue of tolerance on impedance was discussed. The IEEE document is more strict (ok) whereas the IEC document is less clear and clarification is required. In fact, impedance tolerances should be set by the designer of an HVDC system; it is a system issue. A maximum deviation of  $\pm 3\%$  between units of the same design (manufacture) is achievable and should be the criteria.
  - (vii) IEEE C57.129 ANNEX B. The OTHER test is not a temperature rise test (heat run) but is a temperature rise verification for the hottest winding as determined by the temperature rise type test. This OTHER test is performed on all converter transformers on an order. IEC have a similar special test of 12 hour duration with gas in oil analysis.
  - (viii) IEC are producing an applications guide for converter transformers.
7. Alan Forrest presented data on loss measurement and calculation for a number of converter transformers that were recently manufactured; focusing on losses vs tap utilized. Harmonic losses vary with tap position. The harmonic loss test should be carried out at the maximum loss tap position at which the temperature rise test is to be performed. At any other tap the fundamental frequency load loss will be reduced. This reduction is expected to more than offset any increase in harmonic loss because of tap position.
8. Richard Dudley stated that the option of a resonant overvoltage test as a substitute for the switching impulse test is still under investigation. The main problems are availability and cost of high voltage capacitors and a high frequency power supply that is capable of supplying the circuit losses.

R. Dudley

## **9.5 Instrument Transformers - J. E. Smith, Chair**

### **9.5.1 Chair's remarks & Announcements:**

The subcommittee did not meet in Amsterdam

### **9.5.2 Working Group Reports:**

#### **9.5.2.1 WG C57.13.5 - Working Group on Test Requirements for High Voltage Instrument Transformers 115 kV Nominal System Voltage and above – Joe Ma**

The Working Group had two meeting sessions. Both were co-chaired by Pierre Riffon of Hydro Quebec.

- (1) A total of 13 people (7 members and 6 guests) attended the session.

- (2) The minutes of spring 2000 meeting held at Niagara Falls, ON was approved as read
- (3) Draft 14 was surveyed within the SC, after which it will be submitted to the Transformers Committee for balloting.
- (4) Future activities of the WG will be split into two parts:
  - a. To finalize the present draft in order it becomes a Trial Use Guide and
  - b. To revise and add items not included in the Trial Use Guide, e.g. C.T. used for capacitor bank unbalance protection, to the present document.

The normal 2-session meeting is, therefore, recommended so that the first session is reserved for objective (a) and the second session is for (b). To organized the second session, a new chair from the manufacturing members is recommended. When we prepare for the new PAR, we should make sure to put down two names for the chair; one being from the manufacturing and the other is from the utilities (P. Riffon).

- (5) Following changes will be made to D14 in reference to T. Zhao's and Artech's comments:
  - (a) Clause 3.5 - The definition is revised to show "rated (primary)" voltage instead of "nominal system" voltage.
  - (b) Clause 11.1 – The word "pure" is replaced with "substantially" to qualify the sinusoidal current waveform. A note is included to advise readers that the secondary open circuit voltage test shall normally be carried out in high power laboratory with apparent power greater than 20 MVA in order to meet the test requirements.
  - c. Clause 8.4 - Editorial changes will be made to improve clarity, and Figure 5 based on T. Zhao's email of April 5, 2001.
  - d. Figure 1 and 2; Clause 7.9 - The routine sealing test may be performed at any time at the convenient of the manufacturers. A note to that effect will be added to Clause 7.9.
  - e. Table 6 - The second column is removed. The limit for hydrogen is increased from 10 to 15 ppm and methane from 3 to 5 ppm.
  - f. Clause 10.9.3 – A sentence is stating that the test may be performed by energizing from the secondary winding of the transformers.
  - g. Appendix B - Dielectric test at 1000 m or less on transformers for installation at altitude greater than 1000 m – A note is added to allow the dielectric tests at standard level if an agreement is reached between users and manufacturers. This will address the concern that the units could be excessively oversized if the units are tested at corrected voltage levels.
  - h. Documents and confidentiality of information – The relevant clauses regarding the documentation for the test laboratory and for customer review are clear on

how the manufacturers and users should do under those circumstances. No changes are proposed.

- i. The above changes and other based on SC survey will be incorporated as D14.01.

#### **9.5.2.2 WG C57.13.6 – Working Group on Instrument Transformers for use with Electronic Meters and Relays – Chris Ten Haagen**

This WG did not meet

#### **9.5.2.3 Working Group on C57.13 Revision – Tom Nelson**

- This WG met on 4/10/2001 in Amsterdam, there were 10 people present.
- The members present voted to add the Partial discharge test submitted by Tony Jonatti to section 4.7.2.
- It was noted that all dimensions are to be given in SI units.
- Section 8.8.2 should be removed.
- It was also noted that the section on measurements is outdated and needs to be updated for the revision after this one.

#### **9.6 Insulating Fluids Subcommittee - F. J. Gryzkiewicz, Chair (presented by Susan McNelly)**

##### **Current Subcommittee Projects:**

##### **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.**

The Working Group did not meet at the Amsterdam meeting.

The Guide must go through a recirculation ballot before it can be resubmitted to RevCom for approval.

##### **P1258 – Trial Use Guide for the Interpretation of Gases Generated in Silicone – Immersed Transformers – Jim Goudie, Chair.**

The Working Group did not meet at the Amsterdam meeting.

No information on the progress of the new PAR was available.

**C57.111 – IEEE Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance in Transformers.**

The Working Group did not meet at the Amsterdam meeting.

The last report was that this Guide would be sent out after the Amsterdam meeting.

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

The Working Group did not meet at the Amsterdam meeting.

The last report indicated that this Guide would be sent out for a Standards Association Ballot after the Amsterdam meeting.

**C57.106 – IEEE Guide for Acceptance and Maintenance of Insulating Oil in Equipment – Joe Kelly, Chair**

Susan McNelly was acting Chair for the Working Group meeting held Tuesday, April 10, 2001. There were 7 members and 6 guests present.

Draft 6 of the Guide has been submitted for Standard Association Ballot and is expected to be complete by June 1, 2001. Apparently there was some miscommunication and several Working Group members did not receive the notice of Ballot. IEEE will be contacted to see if this can be remedied.

Members and guests identified a couple of corrections to the Guide. If possible, corrections will be incorporated before the Guide is issued.

**C57.139 – IEEE Guide for Dissolved Gas Analysis Of Load Tap Changers – Rick Youngblood, Chair**

Susan McNelly was acting Chair for the Working Group meeting held Tuesday, April 10, 2001. There were 13 members of the Insulating Fluids Subcommittee and 4 guests present.

The latest draft of the Guide was reviewed.

**IEEE Standard 637 – Guide for Reclamation of Insulating Oil and Criteria for Its Use.**

The Working Group did not meet at the Amsterdam meeting. No report was available.

### **Next Meeting**

The Insulating Fluids Subcommittee and its Working Groups will next meet in Orlando, Florida, October 14 – 18, 2001.

Respectfully Submitted:

Susan J. McNelly

for

Frank J. Gryzkiewicz, Chair

Insulating Fluids Subcommittee

### **9.7 Insulation Life Subcommittee - D.W. Platts**

The Insulation Life Subcommittee met at 8:00 AM Wednesday, April 11, 2001 in Amsterdam, The Netherlands. Attendance was 10 members and 20 guests. The minutes of the October 17, 2000 meeting in at Niagara Falls, Canada were approved.

#### **9.7.1 Chair's Announcements**

From the ADCOM meeting on Sunday.

1. Next meeting will be in Orlando, Florida. The schedule will be expanded by one day, with the meeting now ending on Thursday at noon.
2. We have received a call for papers for the 2002 Winter Power Meeting. Information is available to anyone interested in preparing a paper.
3. The transformers committee has been directed to stop work on all standards where NEMA owns the copyright. Work is continuing to resolve the stalemate. None of the standards assigned to our subcommittee are effected.
4. Electronic balloting is on the horizon. By the time our subcommittee does it's next ballot, it will be done all electronically.

#### **9.7.2 Status Reports**

Status reports were given for the following projects:

The Working Group on Revision of Temperature Test Code has completed its work. A draft of Clause 11, Temperature rise tests has been forwarded to Subhash Tuli for the next revision cycle for C57.12.90.

Subhash Tuli reported on PC57.119, "Recommended Practice for Performing Temperature Rise Tests on Oil-Immersed Transformers at Loads beyond Nameplate Rating". A recirculation ballot has been submitted to IEEE, who has released it to the balloting pool. We expect completion in 30 days.

#### **9.7.3 Working Group Reports:**

### **9.7.3.1 Working Group on Definition of Thermal Duplicate – Barry Beaster, Chair.**

The Working Group met on Tuesday, April 10, 2001 at 11:00 AM. We had 6 members and 24 guests in attendance. Don Platts chaired the meeting for Barry Beaster, who could not attend.

The Working Group did not meet in October, so there were no minutes to be approved.

A large portion of the time was spent discussing the thermal performance of duplicate units. It became obvious that many people are confused about the purpose of this guide, and its expected use. It is not a guide for transformer design or testing, but rather a guide for use when interpreting a user's specification.

We had a long discussion about the comparison of the calculated values for a new potential thermal duplicate vs. the similar values of the old tested transformer. Some of the definitions state that the new calculated values should be compared to the original tested values, similar to the way the calculations of the adjusted values are done. Other definitions refer to comparing the calculated values from both units. Barry will be asked to review these definitions and assure that the descriptions are correct.

We found several editorial changes that are required, Title of C57.12.90; proper use of the definitions of directed flow, and guided flow; use of metric in dimensions; clause 4.11 duplicates 4.7; and the exponent Z from 7.2 is not defined.

After correction of the editorial changes, we expect to survey the Subcommittee

There was no discussion of new business. The meeting adjourned at 12:15.

### **9.7.3.2 Working Group on Loading of Liquid Immersed Transformer – L. Pierce, Chair**

The Working Group did not meet since Linden did not attend this meeting.

### **9.7.3.3 Task Force on Winding Temperature Indicators - M. F. Barnes, Chair**

The Task Force did not meet since Mike could not attend this meeting. However, a group of 12 showed up at the meeting time and discussed the status.

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

We concluded that if there was insufficient interest to complete the proposed paper, then there is probably little concern over the present status of temperature indicators. After review with Mike, we will determine if the effort will continue.

### **9.7.4.4 Old Business**

I have been informed that when C57.100 was published in 1999, there was an outstanding negative that was not resolved. It concerned the testing procedure for extending the scope of the document from distribution transformers to power. IEEE has explained to the balloter the options for pursuing his position. I will review the document and the history with Tom Prevost (Standards Coordinator) to determine if the document should be worked on prior to the

expiration of its five year life.

### **9.7.5 New Business**

Items of new business were presented by Dennis Marlow and by Don Platts for Bob Grubb.

The proposals by Mr. Grubb were:

- 1 To prepare a spreadsheet type program to do the calculations necessary for converting heat run data into a test report, for both standard runs and the new overload heat runs. The reasoning was that there are several different methods that could be used and which produce different results.

After discussion, the subcommittee agreed that the chair should investigate the work done by the Working Group on Revision of Temperature Test Code, to see if it had already addressed the potential problem. There was little support, since most companies have already produced software, compatible with their system, to do those calculations.

- 2 "We should start a working group to pull together all the test data from all the tests that have been performed per PC57.119. Compare the results with loading guide calculations, and look at what should be realistic values for the exponents "n", "m" and the time constants for different sizes, constructions, and cooling methods for all transformers."

This will be held for future consideration.

The proposals by Mr. Marlow were to modify the average winding temperature requirements in C57.12.00:

1. Modify C57.12.00 5.11.1.1 to say: "The average winding temperature rise above ambient shall not exceed 70°C at rated KVA for transformers whose windings are cooled using forced directed oil. These transformers are identified as OD\*\*."

The above is a rewording of the IEC 76-2 standard and CSA-CAN3-C88 standards which have the same limits for this cooling class. Note this is only applicable to cooling in mineral oil or synthetic insulating liquid with fire point less than or equal to 300°C. This in no way allows the hot spot temperature rise to exceed the 80°C limit.

2. Modify C57.12.00 5.11.2 to add: "In transformers with concentric winding arrangement, two or more separate windings may be situated one above the other. In this case, the winding temperature limit shall apply to the average of the readings for the stacked windings, if they are of equal size and KVA rating. If they are not, the evaluation shall be subject to agreement between the user and the manufacturer."

Some discussion of these proposals followed, with no overwhelming support or resistance for either. We did discuss the difficulty of changing the basis of rating to 70°C for some transformers and making certain that all coordinating standards are in agreement. Dennis agreed to provide some additional background so that the concepts could be addressed by a task force or working group in the future.

### **9.7.6 The meeting adjourned at 9:15.**

Submitted:

Donald W. Platts

Chair, Insulation Life Subcommittee

## **9.8 Performance Characteristics - D. J. Fallon**

### **9.8.1 Introduction/Attendance**

The Performance Characteristics Subcommittee (PCS) met at 9:30 a.m. on Wednesday, April 11, with 40 members and 41 guests in attendance. 15 of those guests requested membership in PCS. All members and guests were requested to provide E-mail addresses, as E-mail will be the primary means of communication of PCS minutes and other documentation.

### **9.8.2 Approval of Meeting Minutes**

The minutes of the October 17, 2000, PCS Meeting in Niagara Falls, Ontario, Canada, were approved as written.

### **9.8.3 Chairman's Remarks**

#### **9.8.3.1 Administrative Subcommittee Notes**

- 1) Items which are covered by other parts of the minutes have been deleted by the secretary for editorial purposes.
- 2) All WG Chairs are requested to update their Rosters and forward to the PCS Chair by June 30. Lack of attendance or participation for 4 consecutive meetings should result in removal from the membership roster unless there are extenuating circumstances. Members with that record should be contacted regarding the status of their membership.
- 3) Separate E-mails were discussed at meeting time (and have been sent during May) to PCS members and guests distributing valuable information from Naeem Ahmad of IEEE related to web accessed information on the balloting and standards development process, and forwarding Committee Vice-Chair Jin Sim's encouragement for paper submission and sponsorship of technical sessions for the 2002 Winter Power Meeting.

#### **9.8.3.2 Membership**

15 new members were added to the PCS Roster:

Norman Field, Ferranti-Packard  
Alan Forrest, Teshmont Consultants, Inc.  
Robert Ganser, Transformer Consulting Services  
William Griesacker, Pennsylvania Transformer  
Peter Heintzig, Siemens AG  
Marion Jaroszewski, Delta Star  
Brian Klaponski, Carte International, Inc.  
Don MacMillan, Tech-Tran Corp.

Mike McDermott, MJ McDermott & Associates  
Guy Morrissette, VATECH Ferranti-Packard  
Jim Nielson, Pauwels Canada, Inc.  
Gustav Preininger, Consultant  
Einar Purra, ABB Transformers AB  
Raman Subramanian, Pennsylvania Transformer Tech.  
Giuseppe Termine, PECO Energy

The Membership roster will be reviewed shortly. Members who have not attended any of the last 4 meetings will be contacted regarding their removal from the PCS roster – thanking them for past participation, and indicating that they will be welcome to renew their participation and rejoin the group.

#### **9.8.4 Agenda Changes**

None

#### **9.8.5 Working Group Reports**

##### **9.8.5.1 Tap Changer for De-Energized Operation (Off-Circuit Tap-Changer) Specification and Test – Phil Hopkinson, Chair; John Gauthier, Secretary**

The WG met at 8:00 AM on April 10, 2001. There were 20 members and 14 guests present, and 6 of those guests requested membership in the WG. The Minutes of the meeting held on 16 October 2000 were approved, and it was noted that these minutes were included in the IEEE Transformer Committee report.

The Chairman reaffirmed the task to develop a document to deal with off-circuit tap-changers. He noted that the IEC document is IEC 60214 that contains references to both on-load resistance and reactance type tap changers as well as off-circuit tap-changers. He noted that the IEC document has undergone some revisions recently, and these were subject of letter ballot review.

PCS Chair's note: The WG Chair used the IEC terminology "off-circuit tap-changer" during the meeting. IEEE terminology in the recent ballot of C57.12.80 is "tap changer for de-energized operation". The WG Chair agreed in discussion to modification of the Minutes to incorporate the IEEE terminology. The IEC terminology is included as well for the information of PCS members.

The Chairman briefly reviewed the specifics of the task noting that tap change devices are used as integral parts of transformers, liquid-filled and air-insulated. He noted that the tap changers for de-energized operation (off-circuit tap-changers) could be mounted on core clamps, inside a cabinet but not on the core clamp, or in a separate cabinet. These options require close communications between the user and the manufacturer so that satisfactory performance is achievable.

He noted that Tap Changers needed to have a rating in terms of their maximum continuous current. He noted that if the tap changer ran at rated load it could operate in excess of twenty

years. Members engaged in a brief discussion of the expected life of the tap changer – twenty years or higher and how this may or may not be achieved. The standard is intended to communicate the requirements for the tap changer, including load cycles up to twice rated load daily, elevated temperatures, acceptable fluids, and short circuits. These application considerations have particular impact on the proper choice of the electrical contacts. The tap-changer manufacturer needs to understand the expectations of his product and provide uniform rating information to the user.

The Chairman briefly discussed the suitability of the tap-changer in synthetic insulating liquids (Silicone), noting that faster oxidation of the contacts is experienced in these environments. Satisfactory thermal stability and contact life needs to be demonstrated by the tap-changer manufacturer for Silicone as well as for mineral oil and/or air if any or all of these environmental conditions are to be rated.

The WG briefly reviewed the routine (r) and type (t) tests: proposed for the tap change manufacturer: resistance (r), spring pressure (r), dielectric integrity (r), functional life (t), short circuit (t), mechanical endurance (t), operating torque (t) and seal (r). These tests may all be classed as type tests (instead of routine), but should be audited frequently to assure that current production is still in compliance.

The Chairman briefly discussed the temperature rise of contact test. He noted that the tests would most likely be conducted in the brand new state, but the temperature rises seen at that stage may not continue after some period of operation if the contacts are unstable. The functional life test should be conducted as a type test to assure stability over a 20-30 year period. A brief review of testing on six samples of contact materials ensued: silver versus silver in silicone (the most stable contacts in the most aggressive environment); silver versus nickel in silicone; silver versus copper in silicone (not as stable as silver versus silver); copper versus tin in silicone (canceled because of unfavorable results); copper versus copper in mineral oil and copper versus copper in silicone. Silver versus silver demonstrated the greatest stability and exhibited no change in resistance in both a short-term (30 day) and a long-term (6 months) test. He noted that unstable contacts are often detected by the presence of hydrogen gas that proceeds to ethylene and ethane and eventually leads to acetylene that is caused by arcing. Such arcing produces gas bubbles that may cause dielectric flashover and loss of a coil. The conclusion is that the tap-changer must be functional life-tested to verify its stability as a type test.

The Chairman noted that the IEC standard, IEC 60214, contained sketchy rating information. As a result, the US comments on the current revision of the document contained recommendations to include continuous rating information, transient rating information, and suitable environment information.

It was recommended that the IEEE document contain the aforementioned rating information as well as call for the functional life test. It was noted that good communications between the tap changer manufacturer and the user plays a significant role in the delivery of a correct product.

It was inquired if the document would address switches. It was agreed that dual voltage off-circuit switches and delta-wye switches should be addressed.

Members engaged in a brief discussion on the need to ensure harmonization between the IEEE

and the IEC standards. It was noted that harmonization means that both documents should not provide conflicting information; they are not necessarily identical documents. Functional requirements, not construction (design) specific criteria, should be in standards. A document that addresses only temperature rise and not stability is not sufficiently complete, it was noted. It was recommended that the IEC method of calculation of temperature rise, based on 1.2 times rated current, should be considered. It was proposed that the IEC requirements be reviewed and presented at the next meeting of the WG. Mr. Bengt Stenestam agreed to provide such a review.

It was noted that temperature rise at 1.2 x rated load; and also at 2 x rated load would be addressed in the document

The Chairman summarized the need for the document: to establish a communication link between the tap change manufacturer and user. He proposed to offer some language to change C57.131. It was noted that the WG should develop a PAR, since the task has been refined. It was proposed that the proposed revision be presented to the WG preparing the revision of C57.131. Both tasks will be undertaken.

There being no additional business, the meeting was adjourned at 9:20 AM

#### **9.8.5.2 PCS Revisions to C57.12.90 – Bruce Forsyth, Chair; submitted by Neil Kranich**

The Working Group met on Tuesday, April 10, 2001 with 19 members and 15 guests present. There were 10 requests for new membership in the working group. Neil Kranich chaired the meeting in Bruce Forsyth's absence. Minutes from the October 16, 2000 meeting in Niagara Falls were approved as written.

Proposed wording for new test procedures that had been submitted by Subhash Tuli and Dan Perco were handed out to the group for discussion. The wording on DGA testing submitted by Roland James was not available for distribution at this time.

Dan Perco's rewording of the note in clause 4.3 was intended to address an issue raised that the note led to undue concern for the potential of damage during testing. There was a lengthy discussion of both the note and the proposed revision, after which the working group voted to eliminate the note in clause 4.3 completely. Removal of this note leaves the sequence of tests, other than the dielectric tests, unspecified and therefore subject to either the manufacturer's practice or the purchaser's specification.

The proposed wording for Operational Tests of all Devices Operated from the Control Box (Not including LTC Mechanisms), Operational Testing of Load Tap Changers, and Low Frequency Dielectric Test for Low Voltage Control Wiring, Associated Auxiliary Control Equipment, and Current Transformer Secondary Circuits, on Class II Transformers were discussed and approved with minor editorial changes. At this point the meeting ran out of time. Neil announced that Bruce will e-mail the proposed and revised wording of all the new test procedures in survey form within four weeks, in an effort to get everything cleaned up as quickly as possible.

The meeting adjourned at 10:45 AM.

#### **9.8.5.3 PCS Revisions to C57.12.00 – Steve Snyder, Chair; Dennis Marlow, Secretary**

The Working Group met on Tuesday, April 10 at 1:30 PM. There were 17 members and 20

guests in attendance. The following 3 guests requested membership, and are welcomed into the Working Group:

Don Fallon	Public Service Electric & Gas
Marion Jaroszewski	Delta Star Inc.
Raman Subramanian	Pennsylvania Transformer Technology

The minutes from the October 16 Niagara Falls meeting were approved as submitted. Dennis Marlow has agreed to be the Working Group secretary.

An electronic survey of PCS and the WG was conducted in February 2001 addressing various comments received during the balloting of C57.12.00. 125 members were surveyed and 30 returns were received. A total of 23 items were included in the survey; 8 items were approved without comment, 5 items approved with comment, and 10 items were not approved. The purpose of this meeting was to review the comments and resolve as many issues as possible.

The following items were resolved:

- 1) Clause 4.3.3 note (k), regarding unusual service conditions, will remain as it appears in the present version of C57.12.00.
- 2) Clause 5.5.3 concerning the ratings of transformer taps, will be revised as follows: "Whenever a transformer is provided with taps from a winding for de-energized operation, they shall be full-capacity taps. Transformers with load tap-changing equipment may have reduced capacity taps unless specified otherwise, for taps below rated winding voltage. When specified, other capacity taps may be provided. In all cases, the capacity shall be stated on the nameplate."

The group also discussed whether there was any interest in changing the IEEE / ANSI requirements to specify full-capacity taps on LTC transformers for taps below rated voltage. Unanimously, those present voted against considering this change.

- 3) Clause 4.3.3 note (g) will be revised as follows: "Unusual duty or frequency of operation, or high current short duration loading."

Due to time constraints, the remaining items could not be addressed during the meeting. Work will continue via e-mail and telephone to resolve as many of these issues as possible before the next ballot of C57.12.00.

5 items of new business have been submitted for future consideration by the appropriate committee or working group:

- 1) Dennis Marlow, clause 5.11.1, winding temperature rises.
- 2) Dennis Marlow, clause 5.11.2, conditions under which temperature limits apply.

- 3) Don Platts, table 10, note 8, accuracy requirements for nameplate & drawing weights.
- 4) Jerry Corkran, table 13, note (a), phase-to-phase clearances.
- 5) Jerry Corkran, clause 5.1, cooling classes of transformers.

In addition, during the meeting the following items were brought before the Working Group:

- 6) Subhash Tuli, requested that a new section be added to C57.12.00 to address instruction manuals, sound levels, and the correction of a switching surge level listed in table 6.
- 7) Leon Plaster pointed out that the existing ANSI standards do not define a limit on corona for class I transformers, and requested the appropriate committee review this.

The meeting adjourned at 2:47 PM.

#### **9.8.5.4 Loss Tolerance and Measurement - Ramsis Girgis, Chair; Ed teNyenhuis, Secretary**

11 members and 18 guests attended, 4 requested membership.

The first report was from Eddy So on the TF meeting on "Guide of Low P.F. Power Measurements". The complete draft of the guide was discussed. The TF Chairman will send the document to the members of the WG and TF for review. He will discuss the feedback and will make the necessary changes to the document for the Fall meeting. (PCS Chair's Note: This Guide is sponsored by PSIM, but the application is here. If any PCS member wishes to assist in review of this document, please contact Eddy So at [eddy.so@nrc.ca](mailto:eddy.so@nrc.ca))

The next item reported was the status of the "Loss Measurement" Guide. The Guide was sent for balloting right after the Niagara Falls Fall meeting. The closing date of the ballot is April 11, 2001. As of April 9, 2001, 100 returns were received out of 146 total ballots. Out of the 100, 94 were affirmative, 1 was negative and 5 were abstention. The Chairman reported that there were a great number of good comments, mostly editorial, but there were about 10 comments that were of a technical nature which were discussed and resolved at the WG meeting. Once all the ballots have been received, the plan is to make all the changes agreed upon and get approval for reversing the negative ballot(s). The changes will then be sent for re-balloting.

The meeting was adjourned at 5:45 p.m.

#### **9.8.5.5 Switching Transient Induced by Transformer/Breaker Interaction - Bob Degeneff, Chair; Peter Balma, Secretary**

The Working Group on Switching Transients Induced by Transformer/Breaker Interaction was called to order at 8:05 AM on Wednesday April 11, 2001. There were 31 Members and 8 Guests present. After introductions, the agenda for the meeting was reviewed, followed by approval of

the Minutes from the October 17, 2000, meeting in Niagara Falls, Canada. Draft 2 of the guide, minutes, and copies of the overheads presented were distributed.

The PAR, PC57.142 for this working group has been approved.

Tom Tobin of the IEEE Switchgear committee contributed to the working guide by providing a perspective of breaker / transformer interaction from the breaker point of view. He suggested that definitions for this guide need to be consistent with those of the breaker community. In addition, he indicated the switchgear committee has looked at this problem from the  $dV/dt$  and high voltage point of view at the terminals of the transformer. However, they agree this issue has not been addressed in terms of internal resonant voltages.

The group discussed the need for reproducing information relative to understanding the system external to the transformer since it exists in several existing guides and publications, for example CIGRE Report #50 and C37 and IEC standards. The general consensus of the group was to use the results of these guides without reproducing the derivations.

Jeewan Puri provided an update of activities at CIGRE in this area. They propose a workshop in 2002, and to provide a tutorial / guide in the future for understanding interaction phenomena. The present effort is looking to define risk factors for potential problems, and provide a guide to users to determine if further study or mitigation components are needed. A copy of the last CIGRE meeting minutes will be distributed with these minutes.

The table of contents of the existing draft were reviewed to determine if the level of content is sufficient and that all the information needed is included in the guide. As the table of contents was reviewed, the working group looked for volunteers to draft unwritten sections. Various discussions during this review expressed concerns for mitigation methods, transformer sizes impacted, risk analysis, and the economics of study versus mitigation.

The meeting adjourned at 9:16 AM.

#### **9.8.5.6 C57.133 Guide for Short Circuit Testing - Nigel McQuin**

The WG did not meet in Niagara Falls. The PCS Chair reported status. The Ballot is expected to go out very shortly. There is an urgent need to return this document to active status. All members of the Ballot Group are urged by PCS to consider voting affirmative, and to note comments with their ballot if there are areas for suggested enhancement of the document. The Short Circuit Test Guide is presently out of publication, as the Annex originally covering this subject 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 be published. PCS will then initiate a new PAR for revision work to cover any topics that arise in the ballot process.

#### **9.8.6 Project Reports**

##### **9.8.6.1 Status of C57.21, 1990 (R1995) Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500kVA**

The reaffirmation process, which was expected to have been in motion at the time of this meeting, experienced some communication difficulties. The process has been initiated, and

reaffirmation is expected prior to the next meeting. Peter Balma will handle the reaffirmation for PCS. In the Dry Type Reactor WG, Richard Dudley, with assistance from others, has prepared a Draft for an Annex to C57.21 covering specification and testing of thyristor controlled shunt reactors for static VAR Compensators. As reported at the last meeting, Richard Dudley and Peter Balma have both volunteered for leadership roles in the updating of C57.21 after the reaffirmation process is complete. Specific responsibilities will be defined based in part on the needs identified in the reaffirmation ballot.

### **9.8.7 Old Business**

#### **9.8.7.1 Status of IEEE 32, 1972 (R1997) Standard Requirements, Terminology, and Test Procedure for Neutral Grounding Devices**

This document expires in 2002. The Transformer Committee considers that PCS will have the responsibility for updating and maintenance of this document. PCS will work with Tom Prevost to review responsibility, as this document had been administered by the Surge Protective Devices Committee, and review of that Committee's website indicates their plan to "Prepare new standard C62.91 which will be a revision and updating of existing standard IEEE 32.1972." At the very least, input from the Transformers Committee is appropriate. Steve Schappell has volunteered to Chair a new WG to discuss updating IEEE 32, and a meeting will be scheduled for this WG in Orlando. Volunteers are needed to work with Steve on this project. If you have experience or interest, please contact Steve at ([Steven.Schappell@WaukeshaElectric.spx.com](mailto:Steven.Schappell@WaukeshaElectric.spx.com)).

#### **9.8.7.2 Inrush Current Tutorial**

An Inrush Current Tutorial will be scheduled for the Orlando Committee Meeting, building from Phil Hopkinson's and Ramsis Girgis' presentations at the Nashville Meeting. Glen Swift has volunteered to discuss impact of inrush current on differential relaying. Fred Elliott has agreed to discuss BPA experience in dealing with inrush effects. Others considering possible participation (especially utilities with practice in response to inrush issues) are asked to contact either Phil Hopkinson ([hopkinsp@squared.com](mailto:hopkinsp@squared.com)), as Phil has agreed to coordinate the organization of this Tutorial, or myself.

#### **9.8.7.3 Topics for Future Technical Presentations / Panel Discussions / Tutorials**

- 1) Review of the work of Bob Degeneff's WG on Switching Transients Induced by Transformer/Breaker Interaction.
- 2) Discussion on Loss Measurement, sponsored by Ramsis Girgis' WG on Loss Tolerance and Measurement.
- 3) Discussion on the variability (tolerances) of performance parameters for similar transformers, including parameters such as noise, thermal performance, core loss, excitation, inrush, etc.).
- 4) Energy Efficiency as related to the topic of a National Energy Policy

These potential topics will be forwarded on to the Committee Chair. Volunteers who would be interested in developing these ideas further can contact the PCS Chair.

### **9.8.7.3 Scope of C57.12.00 as Related to 25Hz Transformers**

At the last meeting, Don Platts requested a review of the scope of C57.12.00 regarding applicability to 25Hz transformers, and an understanding of the terminology “special transformers”. The topic was raised as no action had been taken since the last meeting. Ramsis Girgis commented that there would be work in his WG on conversion of losses, noise, and excitation current from 60Hz to 50 Hz, and that this could provide a basis of discussion of the 25Hz topic.

There were no other items of new business.

### **9.8.9 Next Meeting**

The next PCS meeting is expected to be scheduled for Wednesday, October 17, 2001, in Orlando, Florida.

The meeting adjourned at 10:35 a.m.

Respectfully submitted,

Donald J. Fallon

PCS Chair

5/31/01

[\(\[donald.fallon@ieee.org\]\(mailto:donald.fallon@ieee.org\)\)](mailto:donald.fallon@ieee.org)

### **9.9 Power Transformers Subcommittee: Everett Hager – Chairman (presented by Joe Watson)**

Tom Lundquist – Vice Chairman

Joe Watson – Secretary

The Power Transformers Subcommittee met at 11:00 AM Wednesday, April 11 with 33 members and 47 guests in attendance. 15 of the guests requested and were granted membership, bringing the total membership of this Subcommittee to an even 100.

After introductions, the minutes of the last meeting were approved.

The Working Group reports were presented as follows:

#### **9.9.1 The working group on the revision of C57.12.10**

Javier Arteaga - Chairman

The Group met at 8:00 AM on Tuesday with an attendance of 27 members.

Administrative Subcommittee members updated the Group on the existing situation between NEMA and IEEE regarding the copyrights of several NEMA standards including C57.12.10. After several discussions, the Working Group recommended to the Administrative Subcommittee to continue the work of this Working Group and request a PAR for either the revision of C57.12.10 or the creation of a new document to cover power transformers. The PAR will be issued for the next meeting.

At this time a draft will be prepared and distributed only within the Working Group members for review and comments.

Additional guidelines were provided for the sections of this draft as follows:

- LTC section to cover the application on delta or wye connections, to regulate either the HV or LV winding with or without variable core flux
- The draft will include preferred BIL ratings from C57.12.00
- New devices not widely used will be included in an annex

Sections of the draft will be sent to the Working Group chairman by June 15 for compilation, and the draft will be sent to the Working Group members by July 15 for comments and further discussion during the next meeting in Orlando.

The following members are preparing the following sections of the draft:

Ratings: John Rossetti, Rich von Gemmingen

Construction: Dennis Marlow, Roland James, Bob Hartgrove

LTC: Jim Harlow

The meeting adjourned at 9:15 AM.

### **9.9.2 The working group on ltc performance**

William Henning - Chairman

The Working Group on LTC Performance met on Tuesday, April 10 at 11:00 AM with 10 members and 19 guests attending. Two guests requested membership after the meeting. Minutes of the previous meeting were approved.

This Working Group has been assigned responsibility for preparing a re-affirmation ballot for C57.131, "Standard Requirements for Load Tap Changers." The Working Group chair will submit a PAR for this activity.

The need for possible revisions of C57.131 was discussed. The Working Group will proceed with reaffirmation to keep the current document valid. Then we will look at additional information and some possible minor changes to C57.131 in a future revision, as discussed below.

Two considerations for revision of this standard after re-affirmation are as follows:

- The first consideration is that Phil Hopkinson chairs a Working Group that is proposing to add information on de-energized tapchangers, based on the IEC 214 clause on this subject. In addition, the Working Group proposes to add the requirements for a functional life test for de-energized tap changers.90-
- A second consideration is review of additional changes made by IEC WG26 on IEC 214 since C57.131 was prepared by IEEE.

The Working Group also discussed terminology used in the document. The distinction between auxiliary supply circuits and control circuits was discussed. It was decided to defer this small issue to a possible future revision.

A subject outline for the Load Tap Changer Application Guide, based on the corresponding IEC document was presented.

The final subject discussed was the need for a definition of Load Tap Changer Contact Life and a uniform and standard way of determining contact life. C57.131 states that (regarding the Service Duty Test) “The results of this test may be used by the manufacturers to demonstrate that the contacts used for making and breaking current are capable of performing, without replacement of the contacts, the number of tap change operations guaranteed by the manufacturers.

Jim Harlow agreed to draft a section of the Guide on this subject.

### **9.9.3 Working group on phase shifting transformers**

Edgar Trummer/Tom Lundquist – Co-Chairmen

The Working Group met on Tuesday, April 10 at 4:30 PM. 9 members and 16 guests were present.

A summary of a re-circulation ballot was presented as follows:

97 eligible people in the ballot group

77 affirmative votes

2 negative votes

7 abstentions

88% return with 97% affirmative

The two negative ballots were discussed. One negative ballot was on an item that was not revised or changed from the main ballot. Since the balloter did not vote negative on this item during the original ballot, the negative is not possible for consideration. The negative ballot was withdrawn

#### **9.9.4 The working group on on-line monitoring of liquid immersed transformers**

Andre Lux/Donald Chu – Co Chairmen

The Working Group met Tuesday, April 10, 2001. Approximately 70 members and guests were in attendance. The majority of the meeting was spent discussing Draft 9 of the Guide. Draft 9 was sent out in March to the Working Group membership in order to solicit comments on the Guide so the Guide can be finished and sent to ballot. Approximately 40 surveys were returned to the co-chairman and some of the comments were discussed. Volunteers to write some of the remaining sections were accepted. The Working Group plans to meet in Orlando the Sunday immediately before the next Transformers Committee meeting. The Guide will be reviewed in detail and edited during this one-day meeting.

A panel session on the status of ON-Line Monitoring will be held during the Orlando meeting. The panel will consist of transformer manufacturers, utilities and monitoring system manufacturers and will discuss trends and the status of on-line monitoring of transformers applications. The presentations will be a purely technical (not marketing) nature. Two volunteers to join the panel came forward. One is from a utility and one is from a manufacturer. More volunteers will be requested. A panel session on this topic will also be conducted at the upcoming T&D Conference in Atlanta, Georgia.

#### **9.9.5 The working group on transformer life extension**

Rowland James – Chairman

The Working Group met at 3:00 PM on Tuesday, April 10 with approximately 35 members and guests in attendance.

After introductions a brief discussion of the latest draft's status was held. After a period of relative inactivity, much progress has been made on the latest draft.

Joe Watson made a presentation on a statistical approach to transformer risk assessment and maintenance. The focus of the presentation was the proposal to create a reliability model similar to a fault tree that can accept inputs from condition assessments of all the transformer's components or systems. This model would take the assessed conditions and calculate the failure probability of each transformer.

Andre Lux also presented information on this Guide's Bibliography and references.

The meeting was adjourned at 4:15 PM.

#### **9.9.6 The west coast transformer working group**

Mike Lau - Chairman

The West Coast transformer Working Group met at 1:20 PM at the Arizona Public Service's Shure Building in Phoenix, Arizona on November 6<sup>th</sup>, 2000. There were four members and seven guests present.

**Members:**

Tom Lundquist

John Irvine

Bob Stewart

Mike Lau

**Guests:**

Stephen Allen

Bill Thompson

Hana Abdallau

Charles Hoesel

Jean-Bernard Dastous

Sam Perkins

Steve Brown

After introductions, Mike Lau provided a brief report on the recent main transformer committee meeting in Niagara Falls, in mid-October, 2000. To attract more participation and attendance, more tutorials and technical presentations will be scheduled for future meetings. Future meeting dates and details were provided.

T.V. Oommen's paper "Bubble Evolution from Transformer Overload" was briefly reported followed by a discussion by the attendees on Bucholz Relay protection.

C57.93 – the Guide for Installation of Liquid-Immersed Power Transformers is due for re-affirmation at the end of this year. Invitations to be members of the balloting pool have already been sent. Mike Lau pointed out that there were issues (such as the acceptable leakage rate for vacuuming; the acceptable vacuum treatment in transformer dry-out; problems associated with re-energizing transformers under cold temperatures, etc.) that need to be re-visited. The Guide also makes reference to the D877 oil dielectric test that is no longer being used to test transformer oil (see the new C57.106 Oil Guide). Therefore, irrespective of the outcome of the re-affirmation ballot, the guide will need to be revised. It is recommended that a Task Force/Working Group be set up to deal with the necessary revision. (See the additional report below on the Amsterdam meeting of this Working Group)

On Old Business, Tom Lundquist reported that the Guide on Phase Shifting Transformers has been successfully balloted with 90% affirmative and four negative votes. The Guide is expected to be completed by March 2001.

Under New Business, two items were brought up:

1. Mike Lau indicated that a method is required for drying out transformers with non-vacuum proof tanks. The hot air method may be used for such purposes. He also reported that an Australian transformer manufacturer apparently used a combination of a hot air and vacuum method and claimed that it is more effective than the traditional hot oil/vacuum method. Perhaps more studies are warranted.
2. Mike Lau indicated that the current Installation Guide does not provide any guidance with respect to the flow rate of dry air required for purging during transformer inspection. Other attendees felt that monitoring the oxygen content is necessary and cautioned that there could be a liability concern if a set flow-rate is provided.

There was no more business and the meeting adjourned at 3:00 PM.

### **9.9.7 The working group on the installation of liquid-filled transformers C57.93**

Mike Lau - Chairman

The Working Group on the Installation of Liquid-filled Transformers was called to order at 1:35 PM on Tuesday April 10, 2001. There were 39 attendees present. The agenda for the meeting was distributed and introductions were made. The Chairman indicated this was an informational meeting to review the re-affirmation ballot of C57.93 and to initiate a Working Group to begin the process of revising this standard. An attendance list was circulated and all guests were asked to indicate if they would like to become members of the Working Group. 12 persons requested membership. In addition, Peter Balma volunteered to be secretary of the Working Group.

The reaffirmation ballot was sent out to 126 individuals and 99 were returned. This was a 78% return with 93 affirmative, 3 negative and 3 abstention responses. The three negative responders were contacted for clarification and agreed to withdraw their negative ballots. However, due to some wording problems on the submission to IEEE one of two actions can be taken. Either the ballot can be re-circulated with the negatives and can be approved with a 75% affirmative vote, or the comments can be re-worded and re-submitted to IEEE. The latter approach will be followed. In addition, a new PAR will be prepared to initiate the revision process for this standard.

The meeting continued with a discussion of the technical comments received during the ballot and outlined in this meeting's agenda.

- a) Hold time for energization after fill
- b) Start-up of transformers below  $-20^{\circ}\text{C}$
- c) Hold time for transformers shipped oil-filled after processing
- d) Oil test method
- e) Level of vacuum for filling
- f) Methods to heat windings before energization during vacuum processing
- g) Acceptable shipping impact forces
- h) Oxygen measurements and relationship to shipping integrity
- i) Use of Metric versus English units

After discussion, it was decided that a survey of the majority of these items with both manufacturers and users would provide a starting point for revisions to the guide.

New items for discussion included the topics of confined space entry, dew point measurements at temperatures below freezing, and safety and cooling issues concerning oil-filled transformers installed indoors. Both will be discussed in additional detail as the Working Group moves forward.

The meeting adjourned at 2:45 PM.

### **9.9.8 Old business:**

Report on TRV breaker-transformer switchgear/transformer project

The following report was presented by Tom Lundquist

- There will be a PAR developed and a High Voltage Subcommittee of the IEEE Switchgear Committee
- Previous volunteer list was lost between Mel Smith's computer crash and Tom Lundquist's computer change-out so we need to get the names and contact information for volunteers again
- Mel will send a letter to all volunteers from the PTSC
- Preliminary investigations support the idea that large transformer capacitance may be measured accurately using simple current injection or resonant techniques. The techniques use a low voltage circuit and are easily set up to conduct tests. These should be simple to use in a laboratory environment and during field measurements.
- Calculations of the capacitance values by transformer engineers seem to be a questionable approach to obtain accurate information.
- Derivation of capacitance values from FRA during factory impulse tests does not appear to be possible because of the capacitance involved in the overall circuit. The impulse generator and measuring device have capacitance values so much larger (in the micro Farad range) than the transformer capacitance (in the Pico Farad range) that the transformer value is not possible to calculate.

### **9.9.9 New business:**

Joe Watson reported on the tutorial held Wednesday at 9:00 AM on standardized control cabinet designs. Both ABB and Smit presented their approaches to a standard cabinet design. A new Working Group will start work on this subject at the next meeting in Orlando. A PAR will be requested when light can be seen at the end of the tunnel.

Florian Costa presented a brief video of a successful 1.0g seismic test of a 500 kV bushing.

The meeting was adjourned at 12:15 PM

### **9.10 Underground Transformers and Network Protectors – Carl Niemann (presented by John Sullivan)**

The meeting was called to order at 9:30 AM, April 11, 2001 in the Orange 1 room of the Hilton Amsterdam. Three members were present.

The Committee reports were as follows:

C57.12.40 – Liquid Filled Secondary Transformers met with C57.12.10 working group to learn more about the copyright issue.

C57.12.24 – The Working Group for Underground Type Three Phase Distribution Transformers met Tuesday April, 10, 2001.

The meeting was called to order at 9:36 AM. The attendance was three members and one guest.

The minutes for the Niagara Fall meeting were approved as written.

Future revisions to the standard were discussed.

1. The next revision of this standard must reflect metric units only.
2. Metrification was discussed. The working group decided it would be best to circulate the material and comments gathered by the metrification Task Force chaired by Dudley Galloway for comments.
3. Construction: materials composition, thickness and coatings were discussed. It was decided to include to include these items in the next revision.

There being no further old or new business, the meeting was adjourned at 10:15AM.

### **9.11 Audible Sound and Vibration - J. Puri, Chair**

The Subcommittee met on Tuesday, April 10 at 3:00p.m. With twelve members and five guests present. The minutes of the last meeting at Niagara Falls, Canada were approved with on editorial correction.

The following items were discussed:

#### **9.11.1 WG Report**

There were no WG reports at this meeting.

#### **9.11.2 SC Chairman's Report on NEMA Activities**

Jeewan Puri, the Subcommittee Chairman reported on the following subjects:

- Jeewan reported on a subcommittee survey on the subject of writing sound intensity and sound pressure measurement procedures. Prior to this meeting, the subcommittee members were sent:
  1. Copies of the present sound level measurement procedures as listed in IEEE Standards C57.12.90 and C57.12.91.
  2. A preliminary draft of sound intensity and pressure measurement procedure written based on IEC 60076-10 by J. Puri.
  3. The recommendations of nine volunteers who had prepared their comments after reviewing the above information.

After reviewing this information, the subcommittee members voted to keep sound level

measurement procedures a part of the present IEEE C57.12.90 and C57.12.91 documents and to update these documents to include sound intensity and sound pressure measurement methods. A working group of 13 volunteers was formed to prepare the first draft of this test procedure.

The subcommittee also voted to write a guide on the subject of sound level measurement procedures in harmony with IEC 60076-10-1 sound level measurement guide.

### **9.11.3 NEMA Activities**

- Jeewan had proposed revised sound level tables for NEMA Standards TR1 and ST 20 for liquid filled and dry type transformers. These tables were extended based on a "Validity Check Equation" to include additional transformer kVA ratings.

This proposal has been reviewed by NEMA membership and is now being circulated for voting.

### **9.11.4 IEC Activities**

- Jeewan reported that IEC WG 25 has now prepared a committee draft (CD) of the sound level measurement guide IEC 60076-10-1. This is an excellent document for us to follow for writing a guide on this subject. However, this draft did not include an informative annex that was proposed by Jeewan to present an analysis of NEMA sound level tables.

The subcommittee recommended that a simple reference to NEMA sound level tables should be sufficient.

There being no other business, the meeting adjourned at 5:00 p.m.

Jeewan Puri

SC Chairman

## **9.12 Bushings - F. E. Elliott, Chair**

### **9.12.1 Introduction and Membership**

Chairman, Fred Elliott opened the meeting at 9:30 AM and welcomed the members and guests. Sixteen members and twelve guests attended the meeting. One request for membership was received. See attachment for membership list.

### **9.12.2 Chairman's Remarks**

Fall meeting in Orlando, FL at the Rosen Centre Hotel, October 14 –18<sup>th</sup>. This will be the first meeting with extended schedule.

### **9.12.3 Approval of Minutes of October 17<sup>th</sup>, 2000 Meeting**

The minutes were approved as written.

### **9.12.4 Working Group / Task Force Reports**

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

Keith Ellis reported that his WG met on April 10<sup>th</sup>, 2001 at 3:00 PM with sixteen members and nine guests present. Five 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 4

Issues /comments on Draft 4 were discussed. Draft 5 will be circulated in the Bushing Subcommittee before the next meeting in Florida.

There were questions about 50/60 Hz testing, thermal stability testing. Keith will be sending an Email to WG members for comments.

3. New Business

A proposal for bushing test sequence was received. It will be reviewed by the manufacturers for inclusion in draft 5. No other new business was discussed.

4. Adjournment

The meeting was adjourned at 5: 30 PM after two sessions.

**9.12.4.2 Task Force on Draw-Lead Bushings**

Russ Nordman reported that his Task Force meeting was held at 1:20 PM on April 10<sup>th</sup>, 2001 with eleven members and seven guests present. No 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

Bushing manufacturers were asked to report on their review of proposals on hottest spot temperature calculation methods and proposals received on draw lead loading. A report on the proposal using same watt loss from central tube was discussed. Testing indicates that this is not the same as measured watt loss in draw leads and therefore is not a viable method for loading calculations.

Presentation of Draw Lead Loading vs. Surface Watt Density was discussed. This is intended to show that different manufacturers and designs have varying capabilities of loading for a given cable size.

A proposal for defining the initial conditions of test and temperature limits will be created and sent to TF members for review and reported in future meetings.

3. Adjournment

The meeting was adjourned at 2:30 PM.

### **9.12.5 Report from Technical Advisor to IEC 36 A**

Russ Nordman reported the following:

1. Review of the main document was done at the last meeting in Milan, Italy. Draft 1 includes minor changes.
2. Initial draft on DC bushing standard has been completed. Draft may be available next year. There are some questions about the IEEE Std C57.19.03.

### **9.12.6 Old Business**

#### **9.12.6.1 Reaffirmation/Revision of C57.19.100**

Fred reported that the two negative ballots could not be resolved. Recirculation with two negatives in progress.

#### **9.12.6.2 Technical Topics**

Fred is looking for topics for future meetings

#### **9.12.6.3 C2 Measurement Study Group**

Mark Rivers was not present to report on this subject. A report is expected at the next meeting.

### **9.12.7 New Business**

#### **9.12.7.1 Interpretation Requests**

A request was received for clarification with regard to cantilever strength. Fred will put together some information on the comments received.

### **9.12.8 Adjournment**

The meeting was adjourned at 10:15 AM

Minutes Submitted By,

Pritpal Singh, Secretary Bushing Subcommittee

## 10.0 Reports of liaison representatives

### 10.1 EPRI – B. Ward

# Memorandum



April 12, 2001

TO: Mr. Ken Hanus  
Secretary, IEEE Transformers Committee  
TXU Electric & Gas  
PO Box 970  
Fort Worth, TX 76101

FROM: Barry Ward, Manager, Power Transformers

SUBJECT: **EPRI LIAISON REPORT**

The following report is for inclusion in your minutes for the April 12, 2001, meeting in Amsterdam:

#### 1. 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 published. An algorithm has now been developed and is described in report number 1000724, *Green-Yellow-Red Diagnostic Method: Transformer H<sub>2</sub>O Assessment Method*. It describes the Transformer Moisture Monitor, a stand-alone software application for the assessment of moisture conditions in the insulation system of a power transformer. Further experimental work and field trials covering nitrogen-blanketed and shell-form transformers are in process.

## 2. 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 project has been completed to monitor a large number of HVCTs and bushings in laboratories and in service, including on-line tan delta, partial discharge (pd) 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 published. At this time, three different failure detection methods are being tried at three different utility sites. These are: an electrical pd method for detecting internal pd, on-line and without taking an outage, an acoustic pd system for measurements in the field, and an on-line tan delta system being evaluated under field conditions but with accelerated aging.

## 3. 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. DTCR 2.1 is being developed to add the IEC transformer thermal model and other refinements.

## 4. 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 8-gas analyzer for nitrogen-blanketed transformers has been developed and is now commercially available. A prototype version suitable for conservator-type transformers began a successful field trial May, 2000, and is now commercially available. Current work at Sandia National Labs will first concentrate on producing a complete model for a hydrogen only sensor with lab verification. Multi-gas modeling will follow.

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 such as acetylene. 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. Report number 1000726, *Dynamic Behavior of Gases and Chemicals & On-Line Monitoring of In-Service Transformer: Laboratory Transformer Simulation Experiments & Field Trials* was published December, 2000.

#### 5. 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.

- Frequency Response Analysis (FRA)

A project has been in place since 1994 to develop a correlation between existing winding conditions and FRA tests before and after internal inspection and re-clamping 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. Recent co-sponsored experiments on a retired 345kV auto-transformer comparing the swept-frequency method and the impulse method were presented at the EPRI Substation Equipment Diagnostics Conference VIII held in New Orleans, February 21-23, 2000 (*Proceedings: Substation Equipment Diagnostics Conference*, EPRI 1000124, June 2000). A variety of problems were introduced individually. In general the study showed that both methods, properly applied, are effective and give similar results. Current work includes the field assessment of the in-situ, on-line impulse technique and the off-line swept frequency method to determine the feasibility of comparing signatures from one technique with signatures from the other, for the assessment of winding movement.

6. 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. XVISOR Version 1.0 is available to EPRI Substations O&M members. An LTC module for this software has been developed and is currently under beta test. It is expected to be available in September, 2001.

7. 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 extensive update and extension, *Guidelines for the Life Extension of Substations (CD-ROM Version)*, EPRI 1000032 is now available to O&M members.

8. 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 on going regarding coking, filtration, contact material effectiveness, the development of oil characteristic signatures for normal and abnormal operation, and novel methods for on-line monitoring.

9. Continuous On-Line Oil Filtration

The objective is to develop or adopt technologies for a passive on-line filter for mounting on transformers to continuously remove moisture, oxygen and oil degradation products to keep oil in pristine condition and thus retard the aging of the cellulose insulation. Laboratory experimental work has been completed. Full-scale simulation tests are in process, and a field demonstration is planned in the next few months. A patent for a special purpose filter designed for the removal of moisture, oxygen, and certain other chemicals has been allowed and will be issued soon. The next step will be commercialization.

10. Environmentally Acceptable Transformer Oils

Objectives are to 1) review the state-of-the-art of dielectric fluids, 2) perform laboratory tests & simulations on available candidate fluids for transformer application, and 3) demonstrate promising fluids in operating transformers. Laboratory tests & simulations have been completed on 12 candidate fluids. Report number 1000438, *Environmentally Acceptable Transformer Fluids: Phase I State-of-the-Art Review; Phase II Laboratory Testing of Fluids* was published December, 2000

**10.2 SCC4 - P. A. Payne**

No report was provided for the minutes.

**10.3 TC 14 TAG - P. J. Hopkinson**



**Minutes:** Technical Advisory Group for TC14  
**Place of Meeting:** Hilton Amsterdam  
Amsterdam, The Netherlands  
**Date & Time of Meeting:** Tuesday, April 10, 2001  
1:30 PM

Members Present

R. DelVecchio	Waukesha Electric
D. Foster	Olsun Electrics Corp
B. Henning	Waukesha Electric
P. Hopkinson	Square D Company
A. Jonatti	Consultant
S. Kennedy	Niagara Transformers
W. Patterson	ABB Power T & D Company
P. Payne	PEPCO
J. Puri	Square D Company
M. Rajadhyaksha	VANTICO
H. Jin Sim	Waukesha Electric
L. Wagenaar	American Electric Power Co

Members Absent

C. Conlopy  
J. Cockran  
J. Foldi

R. Girgis  
C. Johnson  
J. Smith  
T. Traub

Others Present

C. Bush	PEMCO Corp
T. deCourcelle	IEEE
J. Duart	DuPont Inc
K. Eckholz	Siemens PTD
J. Fyvie	VA Tech Transformers
D. Keithly	Siemens Power T & D
J. Lackey	Ontario Power Generation
D. MacMillan	Tech-Tran Corp
M. McDermott	Consultant
S. Metha	Waukesha Electric
H. Nordman	ABB Transformer
P. Riffon	Hydro-Quebec
W. Schwartz	Square D Company
B. Simpson	Quin-T (TC98 Liaison)
H. Smith	PEMCO Corp
R. Wicks	DuPont Inc
J. Gauthier	NEMA Staff

Presiding Officer: P. Hopkinson, Technical Advisor

I. APPROVAL OF PREVIOUS MINUTES

The minutes for the meeting held 16 October 2000 were approved as submitted.

II. MEMBERSHIP

III. OLD BUSINESS

- A. The chairman noted that our meetings are open to all interested participants including our friends from other countries.
- B. Review of Recent TC14 Documents

The chairman noted that IEC and USNC have moved to providing all documents electronically and that members should be alerted to that reality in responding the requests for comments on those documents.

The chairman urged members to review the US comments on TC14 documents and provide any additional comments they feel necessary to amplify the US position if necessary.

It was noted that IEC documents addressing transformer matters tend to address equipment methodologies and not to equipment requirements. This approach to standards provides some unique challenges for the US in participating in the process – by concentrating on methodologies and possible conflict. It was noted that harmonization of standards does not mean the standards should be identical but does mean that there should be no conflicts.

The chairman engaged in a review of each document current under consideration in TC 14:

- 14/388/CDV: Power Transformers, Part 4: Guide to lightning impulse and switching impulse testing.
- 14/389/CDV: Power Transformers, Part 10: sound levels

It was reported that the US proposed that an explanation on the calculation be included in the document. The matter is under consideration in the committee secretariat. It was pointed out that Jeewan Puri is the only US expert on sound levels and provided the basis for US comment on the document.

- 14/391/CD: Power Transformers, Part 11: Dry-Type Transformers

It was noted that the partial discharge test should be permitted to make partial discharge tests on the unit. The IEC WG position is the requirement for an impulse test. It was also noted the functional life of the insulation system – using a fire test -- was a matter of difference. The US position is the fire test is not a function of the insulation systems.

Additional technical discussion ensued. It was pointed out that the IEC document specifies a negative impulse wave; noting that the transformer is subjected to greater stress using a positive impulse wave.

(The Technical Advisor agreed to make additional comments to add positive impulse tests to replace the negative impulse test requirement.)

Members engaged in an additional discussion of the IEC requirement in NOTE to clause 21, noting that the mismatch suggested in the terminology

should be investigated. It was noted that the US is proposing that the text be more clearly stated that any mismatch should be investigated

It was recommended that a NWP be sent to TC98 which is responsible for electrical insulation systems. W. Simmons agreed to provide an email to the chairman.

- 14/392/CD: Tap Changers

It was noted that this document contained some editorial issues and that insulation rating information was too vague. Specific recommendations were provided. Also recommended is the inclusion of the functional life test, an action which is being undertaken in the C57 family of documents. Such action would result in a closer harmonization of the US and IEC documents.

During additional discussion, it was noted that there are no routine test allowed for testing tap changers and that a recommendation has been made for a routine dielectric test. There is a suggestion that such a test could be included as a special one. Members engaged in a brief discussion of proposals to include certain routine and type tests to the IEC document. It was noted that some manufacturers were opposed to the inclusion of additional routine tests in the IEC standard. It was recommended that this problem could be solved by developing type categories of no-load tap changers be established and the requirements thereby identified. It was further noted that it is important for the user to specify the specific rating requirements.

In additional discussion on functional life test, it was noted that its purpose is to simulate accelerated ageing by subjecting the device to tests at twice rated load. The chairman reviewed the results of tests he conducted using various contact metals in mineral and in silicone liquids. The only stable contacts were silver on silver in silicone and mineral oil. The silver was plated over copper.

- 14/385/NP: "Immersed distribution Transformers with Protection and Current Breaking Devices"

It was noted that US C57.12.20 be used by the IEC and that this activity was likely to be shared with IEC TC17 and TC 14. After further discussion, it was noted that C57.12.24 may be a more appropriate reference document.

- A brand new working group has been purposed by the chairman to the IEC to develop a guide for the use of high temperature insulation materials in liquid filled transformers. The proposal will be modified to change the proposed convenor to Rick Merick.

A. Additional Issues

It was noted that TC14 is about to undertake work on short circuit calculations. The chairman expressed an interest in pursuing that matter and that Bob Delvecchio would be participating in the process as the US expert.

C. NEW BUSINESS

There was no new business.

D. TIME AND PLACE OF NEXT MEETING

Members agreed to meet in conjunction with the IEEE Transformer Committee meeting in Orlando, Florida in October 2001.

E. ADJOURNMENT

There being no additional business, the meeting was adjourned at 2:45 PM.

Reported by

John A. Gauthier

TAG Administrator

**11.0 Old Business**

None

**12.0 New Business**

Two items of new business were discussed and they are:

Don Fallon brought to light the dwindling number of users attending the meetings and suggested a letter needs to be written to give to management to encourage their support in employees participating in these meetings. Don said he would talk with committee officers about this and try and draft a letter before the next meeting. It was also brought out the efforts being done by PES to address this problems at a higher level in utilities.

Another issue of discussion was the effort to get the minutes out earlier than in the past. It was also talked about going to 100% electronic on the minutes and not send out any paper minutes. This most likely will be the way in the future but for now paper will continue to be sent out. An effort will be made to get minutes out earlier next time.

**13.0 Adjournment**

The meeting was adjourned at 11:30 AM.

Respectfully submitted,

Ken S. Hanus, Secretary



GROUPS	St.Louis Nov.97	Little R Apr. 98	Leon. MX Nov. 98	NO. LA Apr. 99	Monterrev Nov. 99	Nash. TN Apr. 00	Niagara F. Oct 00	Amster. Apr01	MAX	AVG
<b>Committee Registration: Members and Guests</b>	282	267	262	262	275	302	361	265	361	285
Spouses	32	34	49		35	94	94	67	94	58
Luncheon	147	156	262	262	216	175	217	131	262	196
SC.ADMINISTRATIVE	19	16	19	22	23	23	22	18	23	20
NEWCOMERS ORIENTATION										
SC Meeting and planning										
SC.AUDIBLE NOISE AND VIBRATION	22	32	23	28	31	21	21	15	15	15
WG Sound measurements										
WG Transformer siting guide C57.136										
SC.BUSHINGS	23	32	25	11	27	28	28	28	32	25
WG Revision C57.19.00			36	22	23	25	38	25	38	28
TF Draw Lead Bushings	21	23	23	20	16	24	27	18	27	22
WG Revision C57.19.01	24	33	38	24	22	19			38	27
SC DIELECTRIC TESTS	71	81	80	52	68	91	96	62	96	75
WG Revision to Low Frequency Tests	31	42	20		54	48		34	54	38
WG Revision of Transient Dielectric Tests			20		35	43	37		43	34
TF Rev. to Impulse Tests										
TF L.F. Transformers Dielectric Test Table				28	37		46	60	46	43
WG Partial Discharge Tests	43	51	58	41	66	47	66	65	66	55
SC DISTRIBUTION TRANSFORMERS	37	49	29	36	34	53	41		53	40
WG Dist. Substation Transformers C57.12.36			16	22	22	40	37		40	29
WG Overhead Type Distr. Transfs. C57.12.20		39	19	35	28	49	39		49	35
WG Single-Phase Submersible C57.12.23		41		16	10	20	18		41	21
WG Single-Phase Deadfront Padmount C57.12.25	35	41		30		47			47	38
WG Bar Coding	25	40							40	33
WG Loss Evaluation C57.12.33	55	48				45			55	49
WG Electronic Data Transmittal	20		12			22			22	19
WG Three-Phase Padmount C57.12.34				23		42			42	33
WG Step-Voltage and Induction Regs C57.15	26		16	9					26	17
SC DRY-TYPE TRANSFORMERS	32	22	26	27	25	25	31	20	33	26
WG Test Code C57.91	20	23	20	22	18	11	24	12	23	19
WG Dry-Type Reactors	7	9	6	13	9	10	11	13	13	10
WG Dry-Type Thermal Eval. And Flammability	24								24	24
WG Dry-Type General Requirements C57.12.01	30	28	24	18	26	23	23	14	30	24
WG Dry-Type Thru Fault Current C57.12.59						15	16		16	23
										16

GROUPS	St.Louis Nov.97	Little R Apr. 98	Leon. MX Nov. 98	NO. I.A Apr. 99	Monterre Nov. 99	Nash. TN Apr. 00	Niagara Oct. 01	Amster. Apr01	MAX	AVG
<b>SC HVDC CONVERTER TRNF. &amp; REACTORS</b>										
<b>IEC TC 14 TAG</b>	6	6	7	8	13	7	19	15	19	8
							37	30	37	34
<b>SC INSTRUMENT TRANSFORMERS</b>	10	13	7	11	10	10	17		13	11
WG C57.13.5 Test Req Instr Transf >115 kVA	13	20	13	12	13	10	13	13	20	13
WG C57.13.6 Instr Transf for Electronic Meters & Relays		9	9		20	11			20	13
WG Revision of C57.13	10	17	8	12			10	10	17	11
<b>SC INSULATING FLUIDS</b>	71	84	71	56	68	75	66		84	70
<b>SC INSULATION LIFE</b>	55	73	58	65	56	51	66	30	73	57
WG Loading Liq. Transformer					108		58		108	83
WG Revision of Temperature Test Code	30	34	24	24	29			30	29	26
WG Thermal Duplicate	26	32	22	16	40	27	28		40	31
TF Winding Temperature Indicators					25	27			32	25
<b>SC PERFORMANCE CHARACTERISTICS</b>	74	77	52	45	58	69	82	81	82	67
WG Loss Tolerance and Measurement	18	27	25	26	29	33		29	37	28
WG PCS Rev. C57.12.00	19	36	32	75	65	49	70	37	75	48
WG PCS Rev. C57.12.90	21	33	43	28		42	65	34	65	38
TF Joint/PSIM low pf measurement										
WG Switching Transients	22	31	33	40	0	52	49	39	52	38
WG DETC specifications and tests					50	49	40		50	46
<b>SC POWER TRANSFORMERS</b>										
WG LTC Performance	34	26	25	42	59	66	109	80	109	58
WG C57.140 Transformer Life Extension		31	29	25	30	24	21	29	34	28
WG Monitoring of Liquid Immersed Transformers				31	46	62	48	35	62	
TF Control Cabinet Guidelines	66	83	42	20	54		55	70	70	56
WG Revision of C57.12.10						37	30	27	37	31
WG West Coast	13								13	13
WG Installation of Liquid Filled Transformers, C57.93								39	39	39
WG Phase Shifting Transformers C57.137	26	43	30	31	34	26	45	25	45	33
<b>SC STANDARDS</b>										
Standards Development Paractice Review		11	4	5	23	38		32	38	19
		8							8	
<b>SC UNDERGRND. TRNF. &amp; NETWK. PROTCS.</b>	13	11	14	18	21	26	18	3	26	16
WG Three-Phase Underground Transfs. C57.12.24	13	14	16	10	14	27	15	4	27	14
WG Liquid-Filled Sec. Network Transfs. C57.12.40	16	16	16	17	15	16	15		17	16
WG Secondary Network Protectors C57.12.44	16	12	9		12	10	14		16	12
WG Dry-Type Network Transfs. C57.12.57		5	7	5	10	10	15		10	9

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