IEEE TRANSFORMERS COMMITTEE

MINUTES OF OCTOBER 19, 1981

PHOENIX, ARIZONA

MINUTES OF THE IEEE
TRANSFORMERS COMMITTEE
OCTOBER 19, 1981

MARCH 17, 1982

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MEMBERS OR REPRESENTATIVES PRESENT

W. J. McNutt, Chairman
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J. V. Bonucchi
D. F. Buchanan
D. J. Cash
E. Chitwood
O. R. Compton
F. W. Cook, Sr.
M. G. Daniels
R. C. Degeneff
A. E. Dind
D. H. Douglas
J. D. Douglass
J. C. Dutton
J. K. Easley
J. A. Ebert
E. C. Edwards
P. P. Falkowski
W. R. Farber
S. L. Foster
R. H. Frazer
H. E. Gabel
J. Gerth
D. A. Gillies
A. W. Goldman
J. C. Gorup
W. F. Griffard
J. L. Harbell
T. K. Hawkins
F. W. Heinrichs
C. C. Honey
C. Hurty
G. W. Iliff
R. G. Jacobsen
J. A. Jonnatti
C. P. Kappeler
O. Keller
J. J. Kelly
L. A. Kilar
R. E. Liebich
H. F. Light
C. Lindsay
L. W. Long
M. L. Manning
L. S. McCormick
J. W. McGill
C. J. McMillen
W. J. McNutt
G. G. McCrae
S. P. Mehta
N. J. Melton
C. Millian
R. E. Minkwitz, Sr.
C. E. Mitchell
E. L. Morrison
H. P. Moser
R. J. Musil
W. H. Mutschler
L. Nicholas
E. T. Norton
R. A. Olsson
J. H. Ottevangers
H. A. Pearce
R. L. Schmid
D. R. Smith
L. R. Smith
Dr. Ing. Werner W. Stein
F. R. Stockum
D. Takach
P. L. Tanton
V. Thenappan
R. C. Thomas
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D. E. Truax

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R. A. Veitch
J. W. Walton
R. J. Whearty
J. R. Woodall
W. E. Wrenn
D. A. Yannucci

MEMBERS ABSENT

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L. C. Aicher
J. Alacchi
L. Ananian
S. J. Antalis
J. C. Arnold
R. Avery
A. E. Baker
R. Bancroft
L. Baranowski
J. G. Becket
J. E. Beehler
G. M. Bell
W. W. Bendleton
A. Bimbiris
J. W. Binius
J. D. Borst
G. H. Bowers
H. R. Braunstein
T. Brown
J. Brunke
F. Brutt
D. Buchanan
J. Burkhart
R. A. Burns
E. E. Chartier
O. O. Chew
G. Coffman
J. Corkran
D. Craighead
K. W. Doughty
D. A. Duckett
R. L. Ensign
C. G. Evans
H. G. Fischer
J. A. Forster
R. M. Frey
M. Frydman
G. L. Gaibrois
J. H. Galbraith
C. M. Gardam
R. F. Goodman
C. H. Griffin
J. W. Grimes
R. L. Grubb
R. L. Grunert
G. Gunnels
C. K. Hale
G. Hall
R. S. Hamilton
J. H. Harlow
D. E. Hazelton
C. Hendrickson
W. Henning
J. J. Herrera
A. Higby

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MEMBERS ABSENT

K. R. Highton
M. C. Hillman
P. J. Hoefler
R. H. Hollister
E. L. Hook
E. H. Huber
Dr. M. Hudis
E. T. Jauch
D. C. Johnson
R. P. Johnston
W. D. Jordan
H. M. Kalet
R. H. Kellogg
L. A. Kenoyer
R. F. Kerwin
A. D. Kline
W. A. Kofke
J. Lapp
T. S. Lauber
J. Lazzara
G. Lindland
K. R. Linsley
T. G. Lipscomb
R. I. Lowe
R. Marek
H. B. Margolis
D. E. Massey
J. W. Matthews
R. J. Mayschak
G. P. Michel
C. K. Miller
L. D. Miller
H. E. Mills
W. J. H. Moore
V. R. Mulhall
D. Natrass
J. J. Nay
R. A. Nelson
J. R. Newton
P. Niemiec
S. D. Northrup
T. H. Orrock
W. R. Ossman
R. Pearson
J. J. Phillips
L. L. Preston
G. J. Reitter
A. L. Rickley
D. A. Roach
C. A. Robbins
J. Rodden
T. O. Rouse
P. R. Russman, Jr.
F. I. Samuelsson
L. J. Savio
E. W. Schmunk
D. E. Shefka
R. L. Simpson
R. W. Simpson, Jr.
T. Singh
B. E. Smith
L. R. Stenslund
R. B. Stetson
L. Swenson
F. W. Thomason
W. E. Triplett
G. Vaillancourt
W. E. Vannah
S. G. Vargo
F. Vogel
J. P. Vora
L. B. Wagenaar
R. Wagner
T. L. Walters
S. A. Weincek
R. D. Welsh
A. Wilks
C. R. Willmore
D. Wright
A. C. Wurdack
Z. Zepic

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GUESTS

H. W. Anderl
G. Bryant
G. N. Bull
W. J. Carter
E. J. Cham
D. W. Crofts
J. A. De Leon
D. Fallon
J. Foldi
J. Goodavish
G. Gruehbaum
E. Koenig
W. Lampe
R. E. Lee
D. D. Perco
J. L. Puri
D. M. Shah
B. Stanleigh

1. Chairman's Remarks and Announcements

Mr. McNutt convened the meeting at 8:00 a.m. and welcomed members and guests in attendance. He expressed thanks to Charlie Hendrickson for the excellent arrangements.

2. Approval of Minutes of April 1, 1981

The minutes were approved as written.

3. Report of the Administrative Subcommittee - W. J. McNutt

The Administrative Subcommittee met at 7:00 p.m. on Monday evening, October 19, 1981. (W. J. McNutt)

I. Membership

By action of the administrative Subcommittee, one new member was invited to join the main Transformers Committee:

Charles Hendrickson - Arizona Public Service Co.

Dean Yannucci made available to all Subcommittee Chairmen a revised membership application form for use in future nominations.

Dean has also updated the main committee membership list and will make it broadly available, but he will also make use of the attendance sheets from today's meeting for further updating.

II. Subcommittee Activities

Olin Compton was welcomed as the new chairman of the Performance Characteristics Subcommittee replacing Leonard Long who has very ably managed the work of that subcommittee for 5 years. We extend our thanks to Leonard for a job well done.

It was noted that a new ad hoc task force has been setup under Peter Bellaschi's direction to address "Recommended Practices for Dielectric Tests on 1200 kV Power Transformers."

While the work of the Resonant Overvoltages Working Group was expected to terminate at this meeting, it was reported that their assignment has been extended. A related need was identified to define methods for measuring transformer terminal frequency response. While this might be regarded as a performance characteristic, the assignment was given to the Dielectric Tests Subcommittee since it relates so closely to the Resonant Overvoltages work.

III. Liaison Activities

One change in liaison assignments was necessitated by a job reassignment by Jim Newton. Cal Kappler will now provide liaison with ANSI C57.12.2--Task Force on Distribution Transformer Pressure Relief.

You will note lack of activity on the part of many ANSI committees when you review the liaison reports.

IV. Papers for Power Group Meetings

Leo Savio reported a total of 16 papers were reviewed for the Summer Power Meeting. As a result of the committee review, 12 papers were accepted and presented at the Summer Power Meeting.

A total of 14 papers were veviewed for T&D Confernece. As a result of the committee review, 10 papers were accepted and presented at the T&D Convernece.

There are 23 papers under review by the committee for the Winter Power Meeting.

Thank you for your cooperation during the review process.

V. Future Transformers Committee Meetings

No new dates on locations have been frimed up yet, but the future schedule of meetings will be repeated in the minutes for your reference. Disucssions were held with both George McRae and Russ Minkwitz on the 1984 meetings. For 1985 and beyond, we would welcome invitations for other meeting sites before the next meeting. The schedule of future meetings is as follows:

March 29-31, 1982	Amfac Hotel Airport Marina Los Angeles, California Host: Mr. C. Hurty
October 24-27, 1982	Holiday Inn - Center City Philadelphia, PA Host: Mr. R. Whearty
April 10-13, 1983	Peach Tree Plaza Atlanta, Georgia Host: Mr. G. Evans
November 7-9, 1983	Hyatt Regency Dearborn Detroit, Michigan Host: Mr. D. Cash
April, 1984	Vancouver, B.C. Host: Mr. G. McRae
Fall, 1984	Boston, Massachusetts Host: Mr. R. Minkwitz

The symposium on "System and Transformer Transient Voltage Interaction," organized by Bob Degeneff, was held yesterday and arrangements are still preogressing for a symposium at our next meeting in Los Angeles on "Techniques and Problems in Measuring Transformer Losses," coordinated by Sam Mehta.

VI. PES Standards Coordinating Committee

Leo Savio provided copies of three new forms related to standards development

1. Revised Project Authorization Request

2. New Standard Submittal form for sending completed standards to the IEEE Standards Board.

3. Negative Ballot Resolution form.

Copies were made available to all subcommittee chairmen. It was noted once again that new standards project numbers will now be associated with the appropriate ANSI Standard number rather than an IEEE "P" number.

VII. TOD Activities

The TOD Activities Report has been distributed with other liaison reports. Most items are informative, but I will comment on just a few:

TOD met on Monday evening, July 27, 1981 at the Summer Power Meeting in Portland, Oregon. Items of note are as follows:

1. C. J. Wilie reported on the activities and recommendations of his Ad-Hoc Committee on Accreditation of Environmental Qualification Testing Laboratories and the actions taken by the IEEE Board of Directors in this are at their June 8 meeting. While the Board approved in principle the plan recommended by the Committee, certain areas are to be investigated and possible plan modifications made before final approval by the Board at their August meeting.

   TOD was concerned about the lack of supervision of the program by the Power Engineering Society. While it accepts the present plan's orgainzational structure calling for an Audits and Certification Committee reporting to the Standards Board and Accreditation Requirements Committee reporting to TAB, it recommends to Adcom that the Power Engineering Society recommend to the Board of Directors that the plan be modified so that the Chairman and the members of the Accreditation Requirements Committee be appointed by PES and then approved by the Executive Committee.

2. The Task Force on Dispersed Storage and Generation established at the 1981 Winter TOD Meeting in Atlanta decided that the name of their group should be changed from the original name of Dispersed Sources of Generation. The group has been active in developing membership which would be representative of all entities (manufacturers, users, and general ineterest) interested in the subject area. In addition to members from the interested PES Technical Committees, representatives from the Solar Energy Research Institute, Underwriters Labs, NRECA, IAS, and DOE are involved.

   The Task Force has prepared a draft of an IEEE Position Paper which has been submitted to TOD and Adcom for comment. TOD has approved this draft with editorial comments. After modification, in line with these comments and those of Adcom, the paper will be submitted to Adcom for further action.

3. The Task Force on Coordination of Availability Engineering Activities (CAEA) formed in February, 1980, to provide a focal point in PES for activities in the areas of reliability and availability has been very active with membership from practically all of the Technical Committees. A report is being prepared giving pertinent definitions of availability engineering, describing the activities of the various committees in th area, the coordination actions being taken between committees and with external organizations and recommendations for future TOD action. A final draft of the report will be issued on September 1 for comments with the final report available for TOD action at the 1982 Winter Meeting.

4. The Power Generation Committee, with representatives from the other equipment Technical Committees, is preparing a "Guide for Preparation of Technical Manuals." This document will provide instructions to manufacturers of what material should be included in installation, maintenance, and other technical manuals which should benefit users and installers of power eauipment. The first draft of this document should be available for discussion this fall with balloting by the Station Design Subcommittee in May, 1982, and the Power Generation Committee by October, 1982.

5. The revised TOD Procedural Guide has been completed by the Long Range Planning Task Force and it was approved at the TOD meeting. The Task Force is still working on committee scope revisions and there are still problems in the paper review process which must be resolved. Some of these are:

   a. Prior Publication: What constitutes prior publication? DOE and EPRI reports? Conference records? etc.

   b. Prior Submission: Some authors, when rejected by one committee resubmits papers to another.

c. Preferred Subjects: The Power System Engineering Committee has prepared an article for the REVIEW listing the subjects of papers that will be given preferential treatment for scheduling at a given meeting. The article also recommends early submission of the paper to ease the reviewer's work load and implies preferential consideration.

d. Reviewer's Instructions: The paper reviewers will be cautioned to provide substantial comments on reasons for grades given for the paper, especially for the rejected papers, as these comments are sent to the authors. One case was cited for the 1981 WPM, where the reviewer's comments were not explicit enough for the Committee Publications Coordinator to reject the paper, even though this was recommended by the reviewers.

6. A question was raised by Bell Peace of the Publicaitons Department on how to handle the publicaiton of material presented at Panel Sessions (when desired). TOD recommended that this be handled as a Special Publication and Section V-C of the PES Publication Guide was rewritten by Nancy Heitmann to cover the procedures to be followed.

7. There have been several cases in the past where authors who have had papers presented at Industry Applications Society meetings have requested that their papers be published in the PES Transactions rather than in IAS Transactions. In these few cases, we have agreed, provided that the papers pass our normal PES review process. TOD has decided, however, that this practice should not be repeated. Since all IAS presentations are published in a Conference Proceedings, this constitutes prior publication in an "archival" record, which negated acceptance and publication by PES.

8. Of 315 papers reviewed for the 1981 Summer Power Meeting, 224 were accepted and 91 rejected. There were 1703 pages in the accepted papers. The 91 rejections represented 29 percent, which is below the 38 percent and 33 percent for the 81 WPM and 80 SPM, respectively, but slightly above the 26 percent average rate when both F and A papers were accepted.

9. The Technical Sessions Guide has been revised by the Technical Session Improvement Committee and, with the guidance of Nancy Heitmann, now is issued in three separate secitons: The Author's Guide, which is sent to the author when he is notified that his paper has been accepted, the Session Chairman's Guide, which is sent to the chairman of the technical session when he is confirmed to act in this capacity, and the Discusser's Guide, which, in addition to being available from Headquarters, will be published periodically in the REVIEW. This new procedure was instituted in May of this year in time for this 1981 Summer Power Meeting and,

according to Nancy, has been working smoothly. The technical sessions at this meeting (at least the first several days) have appeared to be somewhat better than previous meetings, so it is hoped that this new procedure aided in this improvement. It is requested that John Essel schedule printing the Discusser's Guide in advance of the 1982 Winter Power Meeting, in the REVIEW--preferably the December or January issue.

VIII. Transformers Committee Operating Manual

Joe Bonucchi has completed his work on revision of the IEEE Transformers Committee Operating Manual and it was reviewed with the Administrative Subcommittee. It contains a wealth of information and will be distributed to the complete membership--main committee, subcommittees, and working groups--as soon as a few finishing touches are added. This is a fine piece of work and we extend our sincere thanks to Joe Bonucchi.

3.1 Audible Sound & Vibration - R. E. Liebich

There were nine members and eleven guests in attendance. Five of the guests expressed interest in being members.

The Chairman read his report of the last meeting of March 31 in Portland. At that time, three new working group projects were activated and three more proposed for future consideration. Mr. William McNutt, Chairman of the Transformers Committee who was present commented that the type of projects presently started, which are established to prepare guidelines and at this time are not intended to necessarily result in a new standard, do not require filing of the IEEE/PES standards authorization form. Therefore, for these activties the subcommittee chairman is initially requesting a newly appointed working group chairman to prepare brief statements for the Transformers Committee stating their purposes and publications objectives of their working group as of this time.

Two of the three working group projects stared in March have been combined into a single project and one of the projects deferred in March was activated along with the appointment of a new chairman.

The working group project structure now exists as follows:

The first active working group project is to review previous subcommittee members' objections to a new ANSI C57 12.90 and C57 12.21 standards. In addition, liaison will be established with the IEC TC14, Working Group 20, and the ANSI S1 Committee for determination of an existing inconsistencies among the ANSI C57 IEC 551 publication and ANSI S1 documents. Also, in general, liaison will be accomplished between the AS&B Subcommittee and such activities as IEEE/PES Station Design Subcommitte, The ASME PTC 36 Working Group, and any other professional organizations working on all the sound and vibration technology relating to power transformer noise and vibration assessment and control. Further, this working group shall be responsible for preparation and maintenance of any reference bibliographies and patent listings concerning the technology for use by IEEE members.

The chairman of this working group is R. E. Liebich and Jack McGill has offered to assist in this effort. The most immediate action is to prepare a response to a proposal dated Septebmer 30, 1981, received from IEC TC14, Working Grup 20, for certain revisions of IEC publication 551. All interested members have been asked to submit their comments to me no later than November 30, 1981. If any of you here were not at that meeting and would like copies of the proposed changes, please get in touch with me.

The second active working group is established to develop guidelines for calcuation of far-field noise spectra, including development of equivalent sound power spectra for transformers. The chairman of this working group, Mr. Lennert Swenson, was not able to be present at this meeting. However, he provided a report of his initial activities as follows:

The questionnaire is in preparation which he proposes to circulate widely to Transformer Committee Members to determine two sets of information.

1. How many users of transformers currently specify noise requirements and/or have interest in far-field estimation of noise derived from NEMA data.

2. What manufacturers and users have measured data basis on hand which they might be willing to share with a working group, if necessary on a anonymous basis for the purpose of increasing the total data on which to base development of a guideline calculation model.

Also, recent studies in technical papers sponsored by ESEERCO and BPA have some fundatmentally inconsisten conclusions regarding the predominance of the first and second harmoncis relative to the fundamental core tone frequency. Mr. Swenson will be attempting to coordinate the roundtable discussion between key authors of these studies to resolve their differences.

The third active working group project is to review currently available practical noise control methods and their relative effectiveness. This project will include cevelopment of far-field test guidelines. The chairman of this working group is Mr. C. G. Gordon from Bolt-Beranek & Newman Incorporated of Canova Park, CA. An immediate task of this working group will be to review the existing Transformers Committee project P5 23 documentation to determine if it is to be retained, modified or dropped and replaced with new documentation. P5 23 is titled "Guide for the Control of Transformer Sound." Mr. Gordon commented also to our meeting on the status of the ESEERCO sponsored report in preparation by Westinghouse & BBN concerning methods for transformer noise control of which he is one of the prime authors.

In conclusion, I will continue to contact acoustical engineering specialists who will contribute to these task efforts or lead working groups to investigate such topics as noise limit criteria and community response estimation techniques, to prepare guidelines for calcualation of transformer noise and audibility annoyance, etc.

A revised current membership list is in preparation based on attendance records of the meeting and previous meetings within the last two years. Those members who have not attended recent meetings will be canvassed by mail to determine if they wish to again become active or be dropped from membership.

3.2 Bushing Subcommittee - J. K. Easley

The Working Group on a Guide for Loading Bushings met on October 19. Since project P757 had already been submitted to the Standards Office in advance of the December meeting of Standards Review Committee there was no major business. Therefore this Working Group adjourned and immediately reconvened as a new Working Group on Bushings to operate in Gas Insulated Substations. Rick Stockum was elected chairman and assignments were given to several members in preparation for the next meeting.

The bushing subcommittee met on Tuesday, October 20 with 11 guests and 9 of its 18 members present. It was announced that project P24 a revision of C76.2 had also been submitted to the Standards Board.

The major item of business was a detailed review of a first pass revision of C76.1 prepared by Nick Melton. Several constructive comments were accepted so that this document is now ready for a first ballot within the subcommittee.

A proposal submitted by an Ad Hoc Committee on the effect of transformer oil level upon bushing temperature was discussed. The Ad Hoc Committee was requested to incorporate the input from the discussion since it appears as though a consensus was obtained.

3.3 Report of Dielectric Test Subcommittee - L. S. McCormick

The Dielectric Test Subcommittee met at 8:00 a.m. on October 20, 1981. In attendance were 43 members and 19 guests (added 2 new member - Jim Douglass and R. H. Frazer). The total membership is now 64.

WORKING GROUP FOR REVISION OF DIELECTRIC TESTS
G. Iliff, Acting Chairman

The Working Group met Monday, October 19, 1981, with 25 members and 28 guests in attendance. Since Ed Adolphson had a conflict and could not attend the Phoenix meeting, George Iliff served as acting chairman. The significant highlights of the meeting were as follows:

3.3 .

1. The minutes of the spring meeting in Portland were approved as written.

2. It was reported that the IEEE Standards Board had approved the new dielectric test standard for 115 kV through 230 kV transformers (ANSI/IEEE C57.12.14) which will now be published as an IEEE Trial Use Standard.

3. It was reported that George Iliff's Task Force had met Sunday with 6 members in attendance. The purpose of this group is to meld the concepts of 262B and C57.12.00 and C57.12.90 documents. This first meeting resulted in some tentative decisions as well as an outline of areas which will need further consideration. However, it will be some time before preparation of any drafts for formal ballot will be initiated.

4. Harold Light reported that the revision of the Impulse Test Guide has been successfully balloted in the main committee and will now be sent to the IEEE Standards Board for review, approval, and publication.

5. It was noted that the Working Group still intends to work on revising the dielectric test portions of ANSI Standard C57.21 for shunt reactors and hopefully some progress will be made by the time of the next meeting in LA.

WORKING GROUP ON REVISION OF DIELECTRIC TESTS ON DISTRIBUTION TRANSFORMERS

W. Farber, Chairman

The Working Group met at 1:00 PM on October 19, 1981.

James F. Goodavish of Wisconsin Electric Power Company has replaced Jim Newton on the Working Group.

Bob Lee of Pennsylvania Power and Light Company has joined the Working Group.

Present membership is 21, 14 affiliations with manufacturers and 7 with users.

Present at the meeting were 11 members and 6 guests.

Minutes of the March 30 meeting in Portland were approved.

3.3 .

The major item of consideration at this meeting was the subject of phase-to-phase insulation tests on 3 phase distribution transformers. Specially invited guests were Ralph Hopkinson of GE's Power Systems Engineering systems Office in Schnectady and Dave Smith of Westinghouse's Transmission and Distribution Systems Engineering Department. These prominent systems engineering specialists had been invited to discuss overvoltages on three phase distribution systems. Mr. Hopkinson discussed overvoltages causes by ferroresonance and dielectric circuit elements and conditions contributing to this phenomenon. Mr. Smith described overvoltages resulting from fault conditions with various system and transformer connections and types of construction.

The Working Group Chairman will appoint a Task Force to study this information and prepare a ballot for phase-to-phase tests on 3 phase distribution transformers.

The Chairman reported suggestions made at our Portland meeting had been incorporated into our proposed paper on revision of dielectric tests on distribution transformers by Mr. McMillan and that the paper has been submitted to IEEE for presentation at the 1982 Winter General Meeting in February, 1982. Mr. McMillan will present the paper.

The project of revision of distribution transformer dielectric test requirements in C57.12.00 was submitted to the IEEE Standards Board for project authorization in May. At the September 17 meeting the Standards Board approved this project and assigned Project #C57.12.00 to this work.

The meeting adjourned at 2:45 PM.

3.3 .

WORKING GROUP ON DIELECTRIC TESTS FOR HVDC STRESSED TRANSFORMERS AND REACTORS

C. Hurty, Chairman

The Working Group met on Monday, October 19, 1981, with 6 members and 3 guests in attendance. The group gained a new member in Dennis Allan of GEC Power Transformers Ltd.

The chairman had expressed reluctance to continue with publication of our Working Group report at a time when new developments in modification of solid insulation resistivities hold the possibilities of alteration of the constants and concern for changes in the dielectric tests. The concensus of the Working Group was that no fundamental changes in the dielectric testing procedures that we have outlined would result from these new developments. The Working Group agreed that it was important to get the report into print and that in order to gain a larger review, we request submittal of this report to the entire Dielectric Test Subcommittee for review and comment. If this is agreeable, I will proceed with this mailing. (Agreed during Subcommittee Meeting - submittal will not be in letter ballot form.)

MINUTES OF THE WORKING GROUP ON RESONANT OVERVOLTAGE

R. Degeneff, Chairman

1. The meeting of the Working Group was held on October 19, 1981, at 8:00 AM with 9 members and 12 guests present.

2. The minutes of the March 30, 1981 meeting were approved as written.

3. A discussion followed in regard to the best method of recording the results of this working groups efforts. Richard Musil pointed out that the same topic is under consideration by CIGRE and felt that a guide would be of more lasting impact than a working group paper. Charlie Honey agreed to chair a task force to find the proper home.

4. A brief discussion by each of the speakers at Tuesdays (October 20, 1981) update and tutorial followed. Bob Degeneff will present the introduction and background. Jim Gillies will discuss field measurements and their progress in the last 10 years. Richard Musil will disucss

3.3 .

the transformer response and Bob Degeneff will follow with a discussion of the transformer-transmission line interaction. A general period of questions and hopefully, answers will follow.

The recommendations of the Working Group and the tutorial will be in three parts:

1) The Working Group is to publish a guide (or paper) containing the distilled results of it efforts. C. Honey will find a proper home for this document.

2) No change to the impulse standards are recommended.

*3) After the guide is published the Working Group will dissolve.

5. The meeting adjourned at 9:43 AM.

WORKING GROUP ON PARTIAL DISCHARGES
M. Daniels, Acting Chairman

The meeting began with a short introduction by M. Daniels substituting for Mr. Z. Zepic. Mr. Zepic has resigned from the IEEE Transformers Committee and related working groups and task forces due to a shift in employer affiliation.

We of the Working Group would like to express our deep regret at the loss of Mr. Zepic's knowledge and abilities. we wish him success in his future career.

The Working Group met with 17 members and 10 guests present.

*In the Subcommittee meeting a new challenge was hurled at the committee. They were requested to think about, over the next 6 months, and to discuss at their next meeting the need for studying and making recommendations on methods and procedures for measuring the response of transformer windings to external transients of varying frequency.

Maybe, after the Working Group finishes its present task, its scope will be redefined and it will surge on to another area which is a natural follow-up to the problem they have been studying.

3.3

The first order of business was approval of the Portland, Oregon minutes. A correction was requested. Dr. Stein requested that the words "IEC Publication 76-3" be substituted for the word "Europe" on page 2. This change will be made and new minutes distributed.

The next order of business was the election of Chairman of Task Forces.

Mr. George Vaillancourt was elected as Chairman of the Task Force for the Measurement of Apparent Charge.

The purpose of the Task Force for the Measurement of Apparent Charge is:

> "To investigate and develop appropriate circuitry to determine partial discharge levels in transformers, reactors and bushings."

This purpose statement was agreed to unanimously.

Mr. Michael Daniels was re-elected Task Force Chairman of the Task Force for Acoustic Detection of Partial Discharges. The purpose of this Task Force is to develop an "IEEE Recommended Practice for the Detection and Location of Partial Discharges in Oil Insulated Power Apparatus Using Acoustical Techniques."

This purpose was unanimously reaffirmed by the Working Group.

Mr. Daniels reported that this Task Force had developed the outline, a proposal for the object, scope, definitions and a partial completion of the factory methods of partial discharge detection using acoustic techniques. A first draft of this recommended practice will be completed by the next Working Group meeting.

The report from the Task Force on RIV measurements had been completed at a previous meeting. However, a copy of this report was not available in the papers sent by Mr. Zepic. Mr. Degeneff will send a copy of this report to Mr. Daniels who will then submit the relevant papers to the new Working Group Chairman.

The Working Group completed it session at 11:50 AM.

3.3

TASK FORCE ON INSULATION LEVELS FOR 1200 KV
P. L. Bellaschi, Chairman

Since the last meeting, a Task Force has been formed whose scope is "To Develop Recommended Practices for 1200 kV Power Transformers and Corresponding Dielectric Tests Requirements." A Project Authorization Form will be filed. This group presently has 7 members and is chaired by P. L. Bellachi.

There were about 12 people in attendance when they met Monday and a lively discussion was held concerning several items of concern, namely:

1. Magnitude of the impulse chopped wave.
2. Magnitude and duration of the long time low frequency test.
3. Desirability of inclusion of a spike during long time LF test.
4. Magnitude and quantity of switching surge tests.

During the subcommittee meeting, John Dutton explained the three types of IEEE documents, i.e., Guides, Recommended Practices and Standards.

There being no other business, the meeting was adjourned.

3.4 Dry Type Transformer Subcommittee - B. F. Allen

The Dry Type Transformer Subcommittee met at 1 p.m. on October 20, 1981 with 13 members and 4 guests present.

The minutes of the March 31, 1981 meeting in Portland were approved as distributed.

The following summarizes the W.G. reports:

The W.G. on Standards for Dry Type Transformers Incorporating Solid Resin-Encapsulated Coils chaired by Mr. Ed Huber met with 13 members and 12 guests present. Following the meeting in Portland, a project request to cover a review of C57.12.01 was submitted to the Standards Office. This request was approved and Project No. PC57.12.01 was assigned. Prior to this meeting a letter ballot was submitted to the W.G. members regarding the scope. One negative ballot was received. This negative was withdrawn at the meeting after the first sentence of the W.G. scope was revised to read, "The scope of this W.G. is to review existing standards related to dry type transformers to identify any needed change or any additional standards applicable to transformers employing resin-encapsulated coils, including solid cast coils, in either the high-voltage or low-voltage windings or both." The remainder of the meeting was devoted to a paragraph by paragraph review of C57.12.01. A number of paragraphs were identified that need further study. The W.G. chairman plans to have a small Task Group complete the initial review and prepare a report to be presented to the W.G. at the next meeting.

The Dielectric Problems W.G. chaired by Mr. Jerry Corkran met with 9 members and 6 guests present. Revisions to Draft #1 of the Winding Transient Voltage Analysis Guide were discussed. Draft #2 will be prepared and balloted in the W.G. prior to the next meeting.

Loading Guide C57.96 Revision W.G. chaired by Mr. Bill Mutschler met with 8 members and 6 guests present. Since the last meeting, a confidential questionnaire was sent to all W.G. members plus 8 manufacturers not presently represented on the W.G. Mr. Manning reported that replies were received from 2 manufacturers and 1 user. Data from a third manufacturer was distributed at the meeting. A formal ballot will be conducted within the W.G. on the continued use of the relative aging curve in C57.96. The time constant formula now in C57.96 was discussed, and it was agreed it was no longer adequate. A new formula for copper windings and aluminum windings is required. The W.G. chairman will attempt to formulate a questionnarie on this subject for W.G. guidance. The constants now in the load vs. temperature equations were discussed briefly. These constants will be explored further at the next meeting.

The remaining W.G.'s did not meet at this time.

3.5 Instrument Transformers Subcommittee - R. C. Thomas

Chairman Thomas called the meeting to order at 8:13 a.m. There were 8 members and 4 guests present.

The minutes of the 3/23/81 and 3/24/81 meeting at Chattanooga, Tennessee, were approved as distributed.

Mr. Thomas reviewed the (incomplete) returns available on the current Sub-Committee and Transformer Committee ballot on proposed ANSI/IEEE C57.13.2 Conformance Test Procedures for Instrument Transformers. The following editorial changes were made, in some instances in response to comments received with the ballots:

1.1. End as follows"...but not exceeding 38kV, except as excluded under 1.2."

1.2,3 Correct numbering to "1.2.3"

1.2.5 End of second line to read "or for the generation, control (including relaying),..."

3.1 Correct "beyone" to "beyond"

6 Change "performance" to "conformance"

8.2 In next to last line change to read"... conditions as defined under 4.1 of C57.13. Usually..."

One negative ballot expressed uncertainty as to the conditions when this document could be invoked by the purchaser. It was suggested that this ballot could be resolved by discussion with the voter.

The other negative ballot received by 10/20/81 concerned the mention of UL 1446 in 8.3, objecting on the basis that UL 1446 is for 600 volt systems and below whereas this document does not cover apparatus for such voltages. UL 1446 was not available, and no resolution of this ballot was proposed until further consideration.

3.5

One comment suggested "Installations on" rather than "Insulations of", in 1.2.3. The Sub-Committee considered retention of "of" as correct, and Mr. Thomas will discuss with the commenter.

Another comment questioned the necessity of requiring heat runs on all units selected for conformance testing. It was agreed that in many cases heat runs on a lesser number of the samples would be technically valid, but no changes were proposed.

Another comment suggested that the number of samples to be selected should be established in a more definitive and statistical manner. The Sub-Committee proposed no changes, on the basis that the approach taken was appropriate for conformance testing and was not intended to represent a statistical sampling of current production.

A question was raised as to conformance testing of 600 volt CT's to be used in higher voltage switchgear by adding additional primary insulation in the switchgear assembly. The Sub-Committee agreed that the CT manufacturer would be responsible for conformance testing of the CT to its insulation rating, and the switchgear manufacturer would be responsible for testing the assembly to any higher insulation levels.

At this time, Mr. Thomas had received 63 returned ballots (of 103 sent), with 50 approved, 9 approved with comments, 3 not voting, and 1 negative. A 75% return, with 75% of returns "approved", is reportedly required for approval.

The following items of discussion typically involved tentative responses from the NEMA Technical Committee (acceptability of these responses to the NEMA Instrument Transformer Group was not known) and typically were in reference to items in Draft #1 of the PSRC Input Sources Sub-Committee Recommendations — for changes—to ANSI C57.13-1978—.

1) Although the Technical Committee had proposed to consider minimum strike distances in response to an earlier request, the Sub-Committee reconsidered this request and essentially withdrew the request pending Mr. Walton's review of the recommendation received by PRSC. It was pointed out that Tables 2 and 3 of C57.13 provide minimum creepage distances and wet withstand voltages and it was suggested that performance specifications relative to flashover would be more appropriate than minimum distances.

2) On the question of requiring a core ground terminal on CT's, it was pointed out that there are high volume designs without grounded cores, and that providing a ground (for testing to identify one turn shorted core) does not necessarily reduce the total number of product failures which will occur. The Sub-Committee agreed that provision of a core ground should not be established as an across-the-board Standard requirement.

3) Mr. Walton, who had previously suggested requirement of exciting current phase angle on excitation curves, accepted the Technical Committee's recommendation that this not be required, stating that the combination of excitation curves and normal accuracy curves would suffice.

3.5

4) The Sub-Committee essentially accepted the Technical Committee's recommendation that the 45° tangent be returned as definition of "the knee", recognizing that this does not preclude the use of other points established without using the "knee" expression. However, this acceptance involved the intention that the 45° tangent would apply to non-gapped iron cores and that a 30°C tangent would apply for gapped cores - appropriate coverage in C57.13 will be necessary.

5) The scale intervals on the C57.13 excitation curve should be clarified.

6) This Sub-Committee accepted the Technical Committee recommendation that relay and metering accuracy ratings be maintained as separate ratings and not interrelated.

7) The Technical Committee will recommend applied potential test levels for 600 volt three-wire current transformers.

8) The Technical Committee recommends increasing the primary applied potential test level to 36kV on 95 and 110 BIL current transformers, to match switchgear test levels, but recommends retention of the 34kV applied potential test on 95 and 110 BIL voltage transformers.

9) There are a number of items under discussion which have the objective of providing additional restraint or clarification on relaying accuracy beyond that provided by present "T" or "C" ratings. These items include requirements as to knee-point voltage (or voltage at some other defined point), closed iron and air gapped CT's, maximum residual magnetism, transient response and return and adjacent phases. Many of these items may be addressed by consideration of the E. Wentz paper "Help for the Relay Engineer in Dealing with Transient Currents". Review of this paper by the NEMA Technical Committee is requested, and Mr. Walton will request comments from the Input Sources Sub-Committee.

It was agreed that the excitation curve (when on hand) provides much of the information required by the relay engineer, and that the relay engineer can often obtain required performance by specifying volts per turn at the knee and maximum winding resistance. However, there is widespread interest in providing a rating system and/or Standard requirements which will prevent errors from dependence on the present rating system.

In regard to 9) the Technical Committee recommends:

a) That "C" and "T" definitions as now established be retained without additional significance, and that any additional requirements be established by additional rating systems or individual specs.

3.5

b) That maximum residual magnetism be a subject for individual specs.

Mr. Stetson reviewed the status of C93 activities, based on the 1980 Status Report of the C93 Committee and the Agenda for the 9/23-9/24/81 meeting.

The Sub-Committee reviewed Mr. Stetson's 4/13/81 draft of C57.13 definitions, particularly in regard to conformity with the IEEE dictionary, accepting some changes for conformity and maintaining some differences considered to represent improvements. A new draft of the material is appended, but is not considered to be a part of minutes.

The Sub-Committee agreed that a Task Force or Working Group should be established on the short-time thermal capability of current transformers, both when inside other apparatus and when free standing. Mr. Walton distributed copies of related Standard coverage in regard to high voltages circuit breakers and oil immersed distribution and power transformers. The tentative organization will include Mr. Basso as Chairman, and representation provided by Messrs. Smith, Falkowski, Morehart, and Stetson. The next issuance of C57.13 will not be dependent on completion of work on this subject.

In regard to the question of phase angle correction factors, copies of Mr. Stetson's 4/13/81 letter to Mr. Basso, and related pages 232, 233, 234 and 239 of the Meterman's Handbook are appended.

Mr. Woodall questioned the present C57.13 coverage of the last column in Table 3. The Sub-Committee recalled previous review of this column and requested that the Secretary research this review. Subsequent to the 10/20/81 meeting the Secretary found that minutes of the 3/18/80 Sub-Committee Meeting contain: "After considerable discussion, the Sub-Committee proposed the following coverage in Table 3 to replace the proposed ballot.

"West Switching Surge Crest (KV)

Circuit breaker closed	Circuit breaker open (Internal only)
825	900
1175	1300
1425	1550

Mr. Thomas will formalize this recommendation and send out a con-current ballot to the Transformer Committee and the Instrument Transformer Sub-Committee".

The next meetings will be held March 29 and 30th, 1982, in Los Angeles in conjunction with the Transformer Committee meeting. It is probable that the new group on C.T. short time overloads will meet on the 29th and the Sub-Committee will meet on the 30th.

The meeting ajourned at 4:45 PM, having recessed from 12:00 to 1:00 for lunch.

3.6 Insulation Life Subcommittee - C. McMillen

The Insulation Life Subcommittee met yesterday with an attendance of 21 members and 41 guests for a total of 62.

There has been one change in membership that is notable. Bob Nelson of GE at Rome, Georgia, has retired after a long and distinguished career. He has been an active member of this Subcommittee and the Loading Guides Working Group. He was particularly helpful in generating the loading tables for the recent revision of ANSI C57.92, and conducting sensitivity studies of the thermal parameters on loading capability. We wish Bob a long and happy retirement and welcome John Dutton who is assuming Bob's Subcommittee and Working Group assignments.

All three of this Subcommittee's Working Groups reported yesterday. The first Working Group reporting was the Thermal Evaluation Working Group. Bob Grubb reported for Al Wurdack, the Chairman, who is on an assignment out of the country. Bob reported that the ballot of the Subcommittee and Working Group on the revision of P345, ANSI C57.100, The Test Procedure for Thermal Evaluation of Distribution Transformers. The ballot had a 75% return with no negative ballots. Al Wurdack is taking steps now to ballot the Transformer Committee.

Ed Norton of EPRI voiced concern about the need to establish conformance dielectric tests on transformers with two-phase cooling. These transformers have higher dielectric strength in the liquid mode than the vapor or bubbling mode. It was pointed out that dielectric tests are not within the scope of this Working Group or Subcommittee. Conformance tests of this type should be taken up by the Dielectric Tests Subcommittee. However, the Insulation Life Subcommittee does have the scope for thermal evaluation, aging and loading capabilities for these transformers. Ed stated that there are now about 300 transformers of this type in service or on order.

A task force under the chairmanship of Dave Douglas has been established to evaluate the final reports of the EPRI contracts on Power Transformer Loading plus other papers on the subject, such as McGraw-Edison's work on temperature effects on the impulse strength of transformers. The aim of the task force is to recommend an IEEE Transformer Committee position on the results and make recommendations if additional work is needed.

The next Working Group reporting was the Loading Guides Working Group chaired by Ron Olsson. Ron's working group met Monday with 20 members and 22 guests in attendance. Ron was happy to report that revision of C57.91-1981 the Distribution Transformer Loading Guide is now published. C57.92-1981 the Power Transformer Loading Guide for ratings equal to or less than 100 MVA has been proofread and is now in printing and should be available after November 13th. If you want a copy it is available by writing to IEEE at New York. Members of this working group should have received by now a copy of C57.91 and will receive a copy of C57.92 by year end. We thank Jan Ottevangers, John Dutton, and Roger Kieran for helping with the difficult job of proofreading C57.92.

3.6

In regard to the project to undertake the revision of the Current Limiting Reactors, we are now back to square one. Jim Spencer of Trench Electric Company who had volunteered to chair the task force has left Trench Electric Company and Reactor Engineering. So we have to find a new chairman. Ron Olsson is looking for a new chairman. So if anyone wants to take on a new and challenging job, please contact Ron and he will probably embrace you and shower you with kisses.

Dave Douglas, Chairman of the Task Force, preparing a Loading Guide for Transformers above 100 MVA, reported a ballot of the working group received on 80% return with a number of negative ballots. The negatives were discussed and resolved. The document will be redrafted and balloted in the Task Force, Working Group, and Subcommittee.

In resolution of one of the negative ballots, it was decided to set up a new task force to study revision of the equations for calculating transient temperature rise and come up with recommendations soon on whether the present equations should be retained or revised. This was prompted by work under way in IEC that indicates revision is desirable. It was noted that liason with IEC should be established and with Bob Veitch's Thermal Test Working Group. The Thermal Test Working Group is preparing a procedure for conducting temperature tests on transformers loaded above nameplate. A part of that guide is intended to determine the exponents of the present transient temperature rise equations. Ron Olsson already has several volunteers for the Task Force, but a chairman has not yet been appointed.

The third Working Group reporting was the Thermal Tests Working Group chaired by Bob Veitch. Attendance at Monday's meeting was 14 members and 9 guests. The meeting was entirely devoted to discussion of Draft No. 4, Part A of the Recommended Procedure for Performing Overload Heat Runs on Oil-Immersed Power Transformers. Part A of this document is intended to deal with tests to determine the exponents used in the transient temperature rise equations in the loading guides. Part B will be a procedure to demonstrate performance under a specified load profile. In the meeting it was agreed to change the title of the procedure to remove "Overload" and use "Loading Above Nameplate Rating."

There was no new business to take up and the Subcommittee Meeting was adjourned.

3.7 Insulating Fluids Subcommittee - H. A. Pearce

The Insulating Fluids Subcommittee met on Monday and Tuesday, October 19 & 20 with sixteen members and nine guests present.

1. The minutes of the meeting on March 30 and 31, 1981 were approved.

2. Membership changes:

Resignations: Roger Pearson - General Electric
Steve Northrup - RTE
Z. Zepic - Ferranti-Packard

New Members: George Bull - General Electric
Mac Thompson - RTE
Jim Bryant - Standard Chlorine
James Thompson - T&R Electric

3. The Chairman reported that under Project P637, Guide for Reclamation of Insulating Oil and the Criteria for Its Use, has been sent to the Standards Board for approval.

4. Project P799

a) A letter was read from Peter Niemiec of EPA clarifying some of the points he made at the previous meeting and updating the present status of EPR regulations. (Copy attached)

b) The section of the guide on Introduction Scope and Minimum Detectability was discussed thoroughly and it was decided to cover the Introduction and Scope in this area and to include the minimum detectability with testing. Frank Heinrichs will revise the Introduction and Scope.

c) The Minimum Detectability and Testing Section will reference the Proposed ASTM Method which is now numbered ASTM D-4059. Earl Morrison will prepare this section.

d) Definitions will be revised by Joe Kelly. Definitions to be added include:

Retrofilling
Askarel
Spill
PCB Storage Area
PCB Transportation Vehicle

e) Labelling and Record Keeping section will be revised by Joe Kelly and Mac Thompson. It was agreed that the description of the label should be in the appendix.

f) Jim Gillies discussed the Disposal Section and discussed whether this should cover disposal of liquid only or liquid and solid materials. The group decided that this should cover liquid only. George Bull will assist Jim in the up-dating of this section.

g) The Chairman will contact Thad Brown - Transporting and
Leo Savio - Worker Protection

3.7

h) It was agreed that those responsible for each section should submit their revised writeup to the Chairman by January 1, 1982 so that they may all be assembled into a draft before the next meeting.

5. Silicone Guide

Discussion was held on the preparation of Guide for Acceptance and Maintenance of Silicone Fluid in Equipment. A project number had been requested by the Chairman. A motion to table this project was defeated. Therefore, the following task force was set up to proceed.

, Chairman

W. Mutschler
J. Dind
M. Frydman
J. Bryant
D. Gillies

6. Discussion on guides for other less flammable fluid led the Subcommittee to take action authorizing the Chairman to set up a Task Force to prepare a tentative guide for any liquid being used commercially if requested.

This, followed by a request to prepare a guide for high temperature hydrocarbon led to the setting up of the following task force to prepare a guide for Acceptance and Maintenance of High Temperature Hydrocarbon Fluids Equipment.

Mac Thompson, Chairman
P. Hoeffler
F. Heinrichs
G. McCrae

7. The Gas Guide was discussed and it was agreed that some revision is needed. A project number will be requested to revise ANSI/IEEE C57.105 - 1978.

8. It was agreed that all members would check into the areas concerned with dioxins and furans as generated in the burning of PCB's and how this might be related to the burning of oil containing PCB's.

9. Adjourned.

10. Next meeting, March 29-31, 1982 - Amfac Hotel, Los Angeles, California.

3.7

Mr. Henry Pearce
Westinghouse Electric Corp.
MMT Department, ML-017
469 Sharpsville Avenue
Sharon, Pennsylvania 16146

Dear Henry:

I have reviewed the minutes of the meeting of the Insulating Fluids Subcommittee, IEEE Transformers Committee, which was held in Portland, Oregon on March 30 and 31, 1981. Upon reviewing the minutes, I felt that some of the legal issues which I discussed were not clearly reflected in the minutes. Accordingly, I have prepared a summary from the notes which I used during my presentation. I would ask that you include this summary in the minutes.

You should also note that since the last meeting, the Environmental Protection Agency has published an Advanced Notice of Proposed Rulemaking on the 50 ppm cut-off issue. This document, which is the first step toward a new rule in this area, was published in the Federal Register at 46 Fed. Reg. 27617 (May 20, 1981). Copies are available from the Industry Assistance Office.

Although budget considerations preclude me from attending the October meeting I am still available to work with the Subcommittee on its "Guide for the Handling and Disposal of Askarels". I am available to answer any questions you or anyone on the Subcommittee may have. I am also willing to review and comment on any drafts you prepare.

I hope I will have the opportunity to see you again soon.

Sincerely yours,

Peter J. Niemiec
Attorney-Advisor
Pesticides and Toxic
Substances Enforcement Division

Attachment

3.8

Summary of P. Niemiec's Presentation to insulating Fluids Subcommittee, IEEE Transformers Committee, Portland, Oregon, March 30, 1981.

The Environmental Defense Fund (EDF) filed suit challenging the PCB Final Ban Rule, 40 CFR Part 761 (44 Fed. Reg. 31514, May 31, 1979). Three aspects of the regulation were challenged:
1) The decision to categorize intact, non-leaking transformers and capacitors as totally enclosed; 2) the decision not to regulate PCB's below 50 ppm (with certain exceptions); and 3) the authorization of certain non-totally enclosed activities. On October 30, 1980, the Court ruled on EDF's challenge. The Court upheld the various authorizations which appear at 40 CFR Section 761.31. However, the court struck down EPA's decision not to regulate PCB's below 50 ppm and to categorize transformers and capacitors as totally enclosed. The Court found that EPA did not have sufficient data to justify these decisions.

If the Court's decision became effective, the use of transformers and capacitors containing any detectable PCB's would become illegal. All parties to the lawsuit realized that this would be an undesirable result. Accordingly, EPA, EDF, and certain PCB user groups, led by the Edison Electric Institute, neogtiated an agreement, which the Court has adopted by its own order. That order includes a set of risk reduction measures for transformers now known as the Interim Measures Program. In summary, the Interim Measures Program provides that PCB transformers and capacitors may continue to be used until August, 1982, subject to the following conditions:

1) Any transformer containing more than 50 ppm PCB's which poses an exposure risk to food or feed products must be inspected for leaks once a week.

2) Any transformer which does not pose an exposure risk to food or feed products and which contains more than 500 ppm PCB's must be inspected for leaks at least once every three months.

3) All observed leaks must be recorded.

4) All observed leaks from transformers posing an exposure risk to food or feed products must be reported to the EPA Regional Office.

5) Servicing must begin on all observed leaks within two business days.

6) Records of the inspection and servicing required by this program must be kept.

The full text of the Court's order, including the Interim Measures Program, appears in the Federal Register at 46 Fed. Reg. 16090 (March 10, 1981). Copies are available from the Industry Assistance Office. The phone number is 800-424-9065.

By Court order, EPA must promulgate new rules defining what is "totally enclosed" by August, 1982. The Edison Electric Institute is conducting a study to develop data on the frequency of leaks and spills from transformers and capacitors. However, anyone with relevant information on this subject is urged to submit to EPA as part of the rulemaking. Comments should be submitted by December 7, 1981.

The Agency must also conduct rulemaking on whether or not there should be some concentration below which PCB's are not regulated. Participation in this rulemaking is also strongly encouraged.

3.8 Performance Characteristics Subcommittee - O. Compton

The Performance Characteristics Subcommittee met October 20, 1981 at the Adams Hotel in Phoenix, Arizona with 35 of 48 members present or represented, and 38 guests.

Minutes of the March 31, 1981 meeting in Portland, Oregon were approved.

The Chairman reviewed the highlights of the Administrative Subcommittee meeting.

Reports of the Working Groups were received as follows:

Working Group on Transformer Reliability - Harold Light, Chairman

The Working Group on Transformer Reliability met on Monday, October 19, 1981, at the Adams Hotel in Phoenix, Arizona. The meeting was conducted from 1:00 p.m. to 2:35 p.m. and was attended by 18 members and 14 guests. The current membership of the Working Group is 30.

An agenda previously distributed to Wroking Group members was used to conduct the meeting.

Bob Nelson of General Electric, Rome, Georgia has retired and John Dutton of General Electric, Rome, Georgia has replaced Mr. Nelson on the Working Group. After the introduction of members and guests, the minutes of the last Working Group meeting were approved without comment.

A report was presented regarding a task force meeting, which met on May 27 and 28 in Detroit, Michigan. Minutes of this task force meeting are Attachment #1.

The chairman then reported a task force meeting was held on Monday, October 19, 1981 in the Adams Hotel at Phoenix from 9:00 a.m. to 11:30 a.m. At this meeting general concerns were discussed by all task force members regarding the eventual use of this Reliability Guide now being developed. As a result of the task force meeting of October 19, 1981 a letter will be drafted and submitted to our subcommittee chairman. This letter will contain: a very brief discription of our work to date; our concerns as to what will happen with this document when work has been completed by the working group; a request for his investigation into what steps shall be taken "now" to investigate implementation and ultimate use of the guide within IEEE and organizations outside of IEEE such as EEI.

Attention was then directed to Draft #1 of the Reliability Guide. Each section was reviewed by the chairman with various Working Group member comments during the discussion. The sections covered and some comments on these sections follows:

Preface - generated not much comment, quite straight forward, a few changes are in order.

1. Scope - outlines what is and is not covered in the guide.

2. Purpose - straight forward but points out that both users' and manufacturers' cooperative efforts are needed.

3.8

3. Confidentiality - it was brought to the attention of the Working Group by one of the Working Group members that confidentiality in present systems is not at times working. General discussion resulted in advisability of at least making an attempt to delineate what is confidential and what is available for public publication. General discussion took place regarding both types of reports.

4. Use of the Guide - some discussion resulted regarding what is statistically corrent and what reports can be used by manufacturers and users to investigate certain aspects of transformer failure. The important point which perhaps was not stressed enough in this section is that only a failure with forced outage can be used to calculate a failure rate.

5. Establishing a Data Base - quite straight forward with it. Noted that both manufacturer and user are to supply information for the data base. Also each term on the population form will be explained in this section.

6. Reporting Failures - although this section is now empty, it will follow the previous section in explaining each term on the failure form.

   It was noted that not only will all the terms be included in these two sections, but that instructions will also be included on the back of each form in an abbreviated manner.

7. Summary Reports from the Data Base - the Working Group chairman requested that all those in attendance, Working Group members and also non-members who wish, shall submit to the chairman, by the end of November any and all reports that each person deems desirable from this Reliability Guide. A previous request was entered at the morning task force meeting. These reports will be the basis for this section and discussion when the task force again meets, which is now scheduled for either December 3 and 4 or 10 and 11, 1981.

8. Analysis of Summary Reports - generated not much discussion but this section will need work relative to what is developed in Section 7.

Both Form #1 and #2, Population Report and Failure Report need reviewing for further refinements. Also the complete Guide will have to be searched for terminology which has entered without being defined in the Appendix, which is the Glossary of Terms.

This concluded discussion of present Draft #1.

The results of Draft #1 ballot (Attachment #2) were discussed. The chairman voiced concern that although encouraged by the six (6) approved and twelve (12) approved with comment returns, that some members of our Working Group are not returning ballots. The chairman shall pursue this in the immediate future so that further balloting can result in valid ballots. We need 75% return for a valid ballot.

3.8

ATTACHMENT I

Minutes Of Task Force Meeting
Transformer Reliability Task Force

A meeting of the Transformer Reliability Task Force was held on May 27 and 28, 1981 at the Host International Hotel at the Detroit Airport as the host of Don Cash and the Detroit Edison Company. Present were: D. Cash, J. Grimes, R. Johnston, J. Lackey, J. Dind, R. Whearty and H. Light.

R. Johnston presented a new Table of Contents arrangement along with sections on Scope, Purpose and Confidentiality. These were completely reviewed and modified by the Task Force.

All comments received from our last ballot were reviewed. After much discussion on each comment, modifications were made to the relative section of the Guide, or the comment was not incorporated into the Guide.

The Population and Failure Reporting System and Forms were then reviewed. Some philosophy changes are forthcoming regarding the filling out of the population form. This will be incorporated in the next ballot of the Guide.

The Glossary of Terms was reviewed. Changes are needed in this section to more clearly define some of the non-statistical reviews which will be available in a report form. At one time these were part of this section but had been removed.

The need was discussed to expand the section on Summary Reports and Analysis to reflect and give examples showing Confidential and Non-Confidential reports.

All changes are to be submitted to the chairman within one month of our meeting. The chairman will attempt a draft for immediate Fask Force member review. After this review a draft of our Guide will be prepared for ballot of the Working Group before the October meeting. It is the desires of our Task Force to present some of the philosophies behind this Guide at the October meeting. The first hour of this meeting will be devoted to this presentation. The meeting will then be open to general discussion. We have a very ambitious program ahead of us, and the Task Force is to be congratulated on their continuing efforts.

Respectfully Submitted,
Harold F. Light

HFL/skl

3.8

Working Group On Transformer Reliability
Ballot on Draft # 1 of an
Overall Reliability Guide

Project #P786 - Preparation of a Guide for Transformer Failure Reporting and Reliability Analysis.

Ballots Sent Out	30
Ballots Returned	20
Approved	6
Approved with comments	12
Disapproved	2
No Objections	0
Returned	20 of 30 or 66%
Of Those Returned	
Approved	6 of 20 or 30%
Approved With Comment	12 of 20 or 60%
Disapproved	2 of 20 or 10%

Tabulated
10/21/81

3.8

The chairman then reported on the work of the: Task Force on Coordination of Availability Engineering Activities (CAEA) - This task force was established in February of 1980 at the direction of the Power Engineering Society - Technical Operations Department TOD. The primary focus of this group is to explore all the availability (reliability) work being done by each TOD Subcommittee and prepare a report of its findings. The report will not only report on the activities in place but also include the coordination between PES Committees, discuss the needs for guidelines, practices and monitoring techniques, desirable coordination with external PES organizations (such as EEI) and make a recommendation for action by TOD. This task force will be dissolved upon submission of its findings which is due at this Winter's Power Meeting.

There is a liaison task force within our Working Group which has been originated to coordinate our activities within the PES and with organizations outside of PES. This group will now have to become very active in order to coordinate our activities. Especially since we will soon have a draft which can be made available for others to review.

With no further discussion or comments the meeting was adjourned.

Working Group on Qualification of Transformers for Class 1E Application in Nuclear Power Stations - Len Stensland, Chairman

The Working Group met on October 16 and 17, 1981 in Phoenix, Arizona with four members present and on October 19, 1981 with four members and one guest present to review Draft 10.1 dated May 29, 1981, plus the open items on aging and qualifications. The latter items were from negative ballots (Draft 10.1) from NPEC SC-2 earlier this year.

At the meetings the Working Group addressed the open items on aging and qualifications plus making other changes. It is expected that Draft 11 should be completed before the end of the year and sent out for balloting to members of NPEC SC-2 and to members of the Performance Characteristics Subcommittee simultaneously.

Working Group on Transformers Connected to Generators - Dean Yannucci, Chairman

The Working Group on Transformers Connected to Generators met on Monday at 1:00 p.m. There were ten members and six guests in attendance.

The minutes of March 30, 1981 were reviewed and accepted without comments.

The meeting was oriented toward reviewing in detail the first five sections of the Draft Guide. Extensive revisions were made to Sections 3, 4 and 5 in order to incorporate the comments received. These sections include the introductory verbiage, the unit transformer connections, the unit auxiliary transformer connections and parameters affecting the selection of the low voltage rating of the unit transformer.

An item of particular interest was the decision to delete 13 of the 15 types of transformer connections now shown in the draft for the unit auxiliary transformer. The concensus of the Working Group was that only

3.8

the delta-wye and delta-wye-wye connections need to be included since these are the most commonly used connections. Another area of revision that will be prepared by Al Goldman and John Woodall is the verbiage for the selection of the transformer low voltage rating to provide for five percent full load regulation which is intended to permit the generator and transformer to operate approximately at the same output voltage at full load when supplying reactive power to the system load. This will be rewritten to incorporate additional possible considerations.

Although not discussed in detail, it was noted that Section 6, Transformer Design Considerations still needed revision to delete tutorial information. This will be done by the Chairman.

It is planned to complete the above revisions by January 1 and then circulate the draft for comments to the Working Group.

The meeting adjourned at 2:45 p.m.

Working Group on Short Circuit Duration - Bill Griffard, Chairman

The Working Group on Short Circuit Duration met on Monday, October 18, 1981 with 15 members and 15 guests in attendance. Jack McGill of Siemens-Allis requested membership following our Monday meeting. This brings our membership to 21 — divided approximately 50% manufacturers and 50% users.

Since the Portland meeting, the fourth draft of Transformer Through Fault Current Duration Guide was issued for L/B. This draft included a single protection curve for Catagory I ($\leq$ 500 hVA) transformers with independent curves included for Catagorys II, III and IV transformers to represent thermal capacility (infrequent faults) and mechanical capability (frequent faults).

A summary of L/B P784/D4 results as presented by the WG Chairman is as follows:

Approved	19	33%
Approved with comments	9	16%
Not Approved	3	5%
L/B not returned	27	46%
	58	100%

The Chairman expressed obvious disappointment in the large number of ballots that were not returned (54% returned in period of 70 days).

Comments as received on L/B were discussed in some detail particularly those resulting in negative votes. Of particular concern in this regard was an objection by one WG member to designating both frequent and infrequent curves as "Low-Risk Level" curves. This member wants the infrequent fault curve to be designated as "Higher-Risk Level." While this area of concern was discussed in some detail the concensus of the group was that we could not justify a choice of words that inferred a capability to assign a specific degree of risk for each curve.

3.8

Two negative votes expressed desire to have Figure 4 (Applicable to Catagory IV transformers) altered so that it does not apply for more than "5." It is believed that this objection can be resolved by making an editorial change to the note on Page 3 of the proposed guide.

Much of the meeting involved discussion of comments considered to be of an editorial nature and included a resolve to interchange the left and right positions of curves on Figures 2 and 3 and to adopt a single curve for Figure 7 covering Catagory IV transformers. This curve, the right hand one, will be designated "Low-Risk-Level-Through-Fault Protection Curve for Infrequent and Frequent Faults."

Draft 5 of this document will be prepared incorporating the changes agreed to during our W.G. meeting. With the approval of the Committee Chairman, this draft will be submitted to the Transformer Committee for Letter Ballot. This will be done with full acknowledgement of the negative ballots that cannot be resolved prior to submittal.

Working Group on Loss Tolerance and Measurement - Dave Takach, Chairman

The Working Group on Loss Tolerance and Measurement met at 8:00 a.m. Monday, October 19, 1981 with 9 members and 13 guests attending. Minutes of the Portland, Oregon meeting were approved with no comment.

Several topics were discussed at the Working Group meeting — the results of a circulation of change at subcommittee level on load loss correction due to instrument transformer error, the results of Working Group ballots on voltmeter connection for no load loss measurement and a vote change regarding hysteresis loss/eddy current loss, and a reference temperature for no load loss.

Instrument Transformer Phase Angle Error Correction

As a result of discussion of comments and negative votes on the subcommittee ballot or correction of load loss measurements due to phase angle error, a circulation of changes made by the Working Group was sent to the Subcommittee members. An editorial change was made as a result of the circulation of changes and now the proposal is ready for balloting at the transformers committee level.

Working Group Ballot On Voltmeter Connection For No Load Loss

The Working Group balloted the first draft of a proposal on voltmeters connection for no load loss measurement with the following results:

16	approved
1	approved with comments
1	not approved
1	not returned
19	total

Corrections were made in the proposal that satisfied the comments and negative vote. The second draft of the proposal will be reballoted at the Working Group level.

3.8

Working Group Ballot on Per Cent Hysteresis Loss/Per Cut Eddy Current Loss

The Working Group also balloted a proposal concerning the division of eddy current loss/hysteresis loss in no load loss measurement when the exact value of those two loss components are not known. The results of that ballot were:

15 approved
2 not approved
1 ballot not returned
1 not voting
19 total

The Working Group was unable to resolve the two negative votes, so it was agreed that the proposal should be tabled until more data could be obtained.

Reference Temperature For No Load Loss

The remainder of the meeting was spent in discussion of a reference temperature for no load loss. The consensus of the Working Group was that no load losses do vary somewhat with temperature and that a standard practice regarding temperature correction should be developed since some manufacturers correct for temperature and some do not. After consideration of some of the technical problems and commercial issues involved the Working Group formulated the following propose:

> If no load losses in distribution and power transformers are measured between a temperature of 15-30°C, as measured by top oil temperature, no correction for temperature shall be made. If no load losses are measured outside the range of 15-30°C, correction shall be made back to the nearest temperature of the specified range.

This proposal will be balloted by the Working Group.

New Business

J. C. Dutton was added to the Working Group membership bringing the total membership to 20. Sam Metha announced the loss seminar for the next meeting. Meeting was adjourned.

3.8

Working Group on Harmonic Load Current Heating - Ed Troy, Chairman

The Working Group met at 10:15 am.m on October 19, 1981, with 18 members and guests.

The first draft of Recommended Practice for Establishing Transformer Full Load Capability When Supplying Non-Sinusoidal Load Currents was discussed. This draft was incomplete in that it did not include calculating basis to be used by transformer designers. There was general support for the scope, format and content of the draft as presented. The comments received will be incorporated and Draft 2 will be distributed prior to the next meeting.

An attempt was made to stimulate a discussion of ways to establish a standardized method for determining the eddy-current losses of each transformer winding. This attempt was unsuccessful. The need for such a standardized method was expressed from the user's viewpoint. The reluctance of manufacturers to participate in this effort was expressed. Some manufacturers consider their calculating model as proprietary information. If the planned bifurcated scope of the document is to be followed, broader and more cooperative manufacturer participation will be necessary.

An alternative; but from the user's view, less desirable; approach will be to reduce the planned scope to include only that of the first draft.

I request that the Working Group meeting be scheduled so that it does not conflict with either the Performance Characteristic subcommittee or the Dry Type Transformer subcommittee or with any Working Group of either subcommittee.

The last two transformer committee meetings have neglected the Rectifier Transformer Study Group. At both meetings, this group held three hour sessions after 7:00 p.m.

For future Transformer Committee Meetings, please arrange for a room for this group. They request four hours — certainly not less than three hours; preferably on one day.

Task Force on Rectifier Transformer Standards under the Working Group on Harmonic Load Current Heating

The Task Force on Rectifier Transformer Standards met on October 19, 1981 at 7:00 p.m. with seven members of the task force in attendance.

The group reviewed the content and arrangement of C57.18 (Pool-Cathode Mercury-Arc Rectifier Transformers). After considerable discussion it was decided that the format of the content arrangement of the new standard would not duplicate C57.18 but would be more nearly similar to the arrangement in C57.15 (Requirements, Terminology, Test Code for

3.8

Step-Voltage and Induction-Voltage Regulators).

The consensus of the group was that the new standard should be a complete document within itself whenever practical. This approach would require a verbatim copy of paragraphs from existing transformer standards rather than just a reference number to a paragraph number of a standard. The group felt this would enhance the new standards acceptability.

The task force was arranged into three groups on a geographical basis for the purpose of having a January meeting of each group with a minimum of travel requirements. The west coast group will prepare a list of sections for the contents of the standard, the northeast group will prepare descriptions covering service conditions and construction of rectifier transforemrs and the southern group will prepare a list of terminology definitions.

The Subcommittee expressed its appreciation to Leonard Long, the outgoing Subcommittee Chairman. Leonard has done an outstanding job and will be sorely missed.

Sam Metha spoke on the spring meeting Seminar on Loss Tolerance and Measurement. Users with an interest in participating in this seminar should contact Sam as soon as possible.

3.9 Recognition and Awards - J. Bonucchi

The chairman noted that the IEEE Board of Directors has named Peter Ballaschi recipient of the 1982 W. M. Hammersol Award which will be awarded at the IEEE Power Meeting. The Citation noted his contribution in the field of transmission and distribution of electric power and the development of extra high voltage apparatus

The chairman also recognized J. Bonucchi by awarding him a certificate of recognition of his long service to the Transformers Committee.

Our congratulations to Peter and thanks to Joe.

3.10 Transformer Standards - L. R. Smith

All subcommittee chairmen have again been cooperative and reported up-to-date status of their projects.

The following is a summary of the activities and status of the various subcommittee projects.

My records have the chairmen as listed below:

R. E. Liebich	Audible Sound and Vibration
J. K. Easley	Bushing
L. S. McCormick	Dielectric Tests
B. F. Allen	Dry Type Transformers
O. R. Compton	Performance Characteristics
H. A. Pearce	Insulating Fluids
C. J. McMillen	Insulation Life
R. C. Thomas	Instrument Transformers
R. G. Jacobsen	West Coast
L. R. Smith	Standards

Project Status

PC57.12.01 - General Requirements for Dry Type Distribution and Power Transformers

New project. Being reviewed in relation to needs for standards covering transformers incorporating solid resin-encapsulated coils.

PC57.21 - American National Standard Requirements, Terminology and Test Code for Shunt Reactors

A task force has been formed to review the dielectric test requirements for shunt reactors under Dielectric Test Subcommittee.

PC57.95 - Loading Guide for Regulators

Revision is in initial stages.

PC57.96 - Guide for Loading Dry-Type Distribution and Power Transformers

New project. Data is being solicited to determine what changes, if any, should be made.

P21 - Revision of ANSI C76.1

Work in Bushing Subcommittee still going on (no change).

3.10 .

P24 - Revision of ANSI C76.2

Forwarded to Standards Board September 3, 1981.

P65 - Thermal Evaluation of Ventilated Dry-Type Power and Distribution Transformers

Transformer Committee action complete. Expect the document will go to the Standards Board before the Phoenix meeting.

P76 - IEEE Guide for Acceptance and Maintenance of Transformer Askarel in Equipment

No change reported since March, 1980.

P93 - Transformer Impulse Tests (C57.98)

Draft has been balloted in the Working Group. Negative ballots are being resolved.

P238 - Revision of ANSI C57.21, Correction of Loss Measurements on Shunt Reactors

No change in over two years.

P262E - Revision of C57.12.90 Loss Tolerances

Work being handled piecemeal as several different matters have come up one at a time and referred to the Working Group. A subcommittee ballot on instrument phase angle error correction is being resolved preparatory to a committee ballot. All other matters reside in the Working Group.

P345 - Review of IEEE Std. 345-1972 Test Procedures for Thermal Evaluation of Oil-Immersed Distribution Transformers (C57.100-1974)

Balloting complete in subcommittee with 75 percent approval and no "No" votes. Now we are ready for balloting in the Transformers Committee.

P462C - Revision of C57.12.00 Loss Measurements

See 262E.

P507 - Revision of C57.92, The Power Transformer Loading Guide

Being proofed at ANSI to be printed October, 1981.

P513 - Seismic Guide for Power Transformers and Reactors

No report after going to the Standards Board.

3.10 .

P523 - Guide for the Control of Transformer Sound

No change reported.

P545 - Recommended Practice for Partial Discharge (Corona) Tests for Transformers

No change reported.

P546 - Revision of ANSI Requirements for Instrument Transformers C57.13-1978.

Draft of C57.13.2, Conformance Test Procedures for Instrument Transformers, out for ballot in subcommittee and main committee. Work continuing on revision of C57.13-1978.

P547 - Revision of ANSI C57.94-1958, Guide for Application, Installation, and Maintenance of Dry-Type Transformers

Still in ANSI BSR.

P637 - Proposed, Guide for the Reclamation of Insulating Oil and the Criteria for Its Use

Subcommittee is finishing up this project.

P638 - Standard for Type Tests on Class IE Transformers for Nuclear Power Generating Stations

Efforts are not very successful. The Working Group is working on negative ballots and comments from NPEC SC-2. The Working Group's chairmanship is reported to have been changed, but no resignation of the incumbent has been received, and no new chairman has been appointed.

P670 - Switchgear and Transformers Working Group on Instrument transformers for High Voltage Circuit Breakers

No change reported. Last known action was ballot D4 which was mailed September 16, 1980.

P673A - Shunt Reactor Audible Sound Test Code Addition to ANSI C57.21

No change reported.

P673B - Shunt Reactor Vibration Test Code Addition to ANSI C57.21

No change reported.

P731 - Revision of Guide for Loading Current Limiting Reactors, ANSI C57.99

Back to square 1. Jim Spencer, who took over in Portland, has a new job and had to resign. Need new chairman.

3.10 .

P732 - Revision of Current Limiting Reactor Standards, ANSI C57.16

No change reported. Last action was Jim Duckett's resignation March, 1980.

P733 - Revision of Shunt Reactor Standard, ANSI C57.21

In process at ANSI. Expected to be printed by October, 1981.

P740 - Dielectric Test Requirements for Power Transformers for Operating at System Voltage from 69 through 230 kV (C57.XX)

Draft has been sent to Standards Board for their consideration.

P745 - Guide for Conducting a Transient Analysis for Dry-Test Transformers (C57.XX)

No change reported since October, 1980.

P756 - Guide for Loading Transformers Above 100 MVA

Draft No. 4 being balloted in Working Group.

P757 - IEEE Guide for Loading Power Apparatus Bushings

Document has been forwarded to Standards Board.

P784 - Coordination of Overcurrent Protective Devices with Power Transformers

This activity is making slow progress. Consensus proved hard to reach. The last ballot of the Working Group and the subcommittee failed. Revised document will now be balloted simultaneously in the Working Group and the subcommittee.

P785 - Transformers Connected to Generators

Draft No. 2 of the guide is being circulated in the Working Group for comment.

P786 - Transformer Failure Reporting and Reliability Analysis

Balloting of a complete guide in the Working Group with circulation to other groups for comment is very near.

P787 - Transformer Loss Measurements and Tolerances

In 1979 this project was deactiviated, and the work divided into:

P262E, Loss Tolerance
P462C, Loss Measurement
Consequently, no further report will be made on P787.

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P799 - Guide for Handling and Disposing of Askarels

Working in the subcommittee.

P800 - Bushing Application Guide

Bushing Subcommittee is still working.

P801 - Recommendations for Revisions to ANSI C57.15 Requirements, Terminology, and Test Code for Step-Voltage and Induction-Voltage Regulators.

Compiling draft No. 3 which will be discussed by the Working Group in Phoenix.

P832 - Detection and Measurement of Partial Discharge (Corona) in Instrument Transformers

Indications in March, 1981 were that this project would probably be incorporated into C57.13. No change has been reported since that time.

P838 - Guide for Performing Overload Heat Runs

Still in initial stages of review.

P842 - Loss Evaluation Guide for Power Transformers and Reactors

Working on a draft.

In the Performance Characteristics Subcommittee there have been two requests for Project Authorization:

1. Harmonic Load Current Heating of Transformers

2. Semi-Conductor Rectifier Transformer

Also in this subcommittee two other items have been proposed for review:

1. Ratio Test Tolerance Wording. This work was assigned to a subcommittee member who stated in Portland that this work will be done.

2. Impressed Voltage During Short-Circuit Test. Proposal submitted to the Working Group on Short-Circuit Duration by Mr. Goldman, who was absent at Portland.

O. R. Compton has replaced Leonard Long as chairman of this subcommittee.

In the Dielectric Tests Subcommittee a Project Authorization request has been submitted to the Working Group on Dielectric Tests of Distribution Transformers. Also in this subcommittee, a task force has been formed to consider action in the trial use document 262B (Dielectric Tests of Transformers for Use on Effectively Grounded Systems, 345 kV and above.)

3.10 .

In the Insulating Fluids Subcommittee work will soon begin on a Guide for Handling Silicone Fluids.

If readers of this report note any projects listed that are no longer active or valid and should be removed, or if any active ones are not listed, please let me know so that I can add or delete as necessary. Please furnish P number, title, and relation to IEEE on ANSI Standard.

3.11 West Coast Transformer Subcommittee

The West Coast Subcommittee met Tuesday, October 20, with 9 members and 5 guests present.

P513 Seismic Guide for Transformers and Reactors - Complete except for one negative vote in the Transformers Committee.

P842 Loss Evaluation Guide - A working group met Monday, October 19, 1981, with 8 members and 12 guests and worked on Draft No. 3.

A proposed project (not yet authorized) for the West Coast Subcommittee, is the consolidation of Installation Guides C57.12.11 and C57.12.12, along with a revival of rescinded Guide C57.93.

4.0 Transformers Committee Liaison Reports

PES STANDARDS COORDINATING COMMITTEE (L. J. Savio)

The PES Standards Coordinating Committee met at the IEEE Summer Power Meeting. The following summarizes the items of interest to this committee:

A copy of Project Authorization Requests should be sent to Claudia Roth in the Standards Office when they are distributed for establishment of coordination.

The proposed Standards Numbering System was discussed at length and there appears to be no problems with XXXX and PNNN formats. The YYY and ZZZ formats will present problems to some Technical Committees whose work may not be covered by a single alpha-numeric code. Also, the proposal did not discuss whether the proposed new system will be back-fitted to existing standards upon implementation or upon reaffirmation/revision. Each Technical Committee will submit its comments directly to the SCC Chairman.

Attached are copies of the new forms to be used for all future standards.

4.0 .

ANSI C57 - TRANSFORMERS (J. C. DUTTON)

STATUS OF IEEE AND ANSI C57 BALLOTS, AND PRINTING 9/21/81

ANSI C57
BALLOT NO.

IEEE PROJ. NO.	BRIEF DESCRIPTION	IEEE STD BD SUBM.	ANSI C57 COMM. SUBM.	ANSI BSR SUBM.	EDIT, TYPESET	PRINTING
344	C57.12.51 (Dry-Type)	N/A	C	C	C	Printed
345	C57.12.52 (Dry-Type)	N/A	C	C	C	Printed
346	C57.13.1 (Gd. Fld. Testing Rel. Ct's)	C	C	C	C	Printed
347	C57.12.20 (Dist. Trans. rev.)	C	C	C	C	Expected 10/8
348 P733	C57.21 (Shunt Reactors)	C	C	C	C	Expected 10/8
349 P547	C57.94 (Dry-Type Rec. Pract.)	C	C	C	IP	
350 P507	C57.92 (Pow. Tr. Ldg. Gd.)	C	C	C	C	Expected 10/8
351 P631	C57.91 (Dist. Tr. Ldg. Gd.)	C	C	C	C	Printed
352	C57.12.25 (Dist. Tr.)	N/A	C	C	C	Expected 10/8
353	HVACC, C57.12.55, Dry Type	N/A (?)	C	C	IP	
354	HVACC, C57.12.27, Dist. Tr.	N/A	C	C	IP	
355	HVACC, C57.12.13, Power Tr.	N/A	C	C	IP	
356	HVACC, C57.12.3, Inst. Tr.	N/A	Reballot			
357	C57.97 Rescission	N/A	C			
358	C57.12.24-1981, Dist. Tr.	N/A	IP	C	IP	
359	C57.12.40-1981, Dist. Tr.	N/A	IP	C	IP	
	C57.12.14, PT Dielectric Tests (115 - 230 KV)	IP				

Bltg. = balloting IP = in process C = complete N/A = not applicable

(?) Questions raised by B. Stanleigh (IEEE Staff)

4.0 .

IEC ACTIVITIES (J. C. DUTTON)

1. Several pertinent IEC proposals have been sent to members of the Technical Advisory Group for IEC TC 14 for comment, and a few comments have been received.

2. IEC TC 14 has the following Working Groups:

   WG 9 : Preparation of a chapter of the IEV on transformer terminology
   WG 14 : Insulation
   WG 16 : Impulse testing guide
   WG 17 : Dry-type power transformers
   WG 18 : Revision of Publication 354 (Loading Guide)
   WG 19 : Amendments to Publication 76 (Basic IEC Transformer Documents)
   WG 20 : Revision of Publication 551 (Sound)

   The US Technical Advisor to IEC TC 14 has been endeavoring to place qualified US transformer engineers on several of these Working Groups since participation in Working Groups is considered the most effective method of introducing US ideas and practices in developing IEC Documents.

   The following individuals have agreed to participate in IEC WG's as "Members Working by Correspondence" (which does not require attending meetings).

   WG 16 : H. F. Light
   WG 17 : J. C. Dutton
   WG 20 : R. E. Liebich

   Another nomination has been presented for Working Group membership, but has not yet been processed by the USNC/IEC.

   Individuals interested in participating in IEC WG's are encouraged to contact the US Technical Advisor to TC 14 (J. C. Dutton).

3. There have been no meetings of IEC TC 14 since March 1980. The Secretariat of IEC TC 14 has been contacted to obtain information on future TC 14 meetings. No meetings of TC 14 or TC 14B are expected until late 1982 or 1983.

4. The last new TC 14 Document to be issued was Publication 76-3, 1980; "Power Transformers, Part 3: Insulation Levels and Dielectric Tests." This can be obtained from ANSI.

5. J. C. Dutton presented a paper at the American Power Conference in April 1980 entitled: "Change in International Trade and the Electrical Industry."

4.0 .

ANSC C57.12.1 - POWER TRANSFORMERS (J. C. Dutton)

There was a sparsely attended meeting of ANSC C57.12.1 held in January 1981 which discussed revision of ANSI C57.12.10-1977 and ANSI C57.30-1977 due in 1982. J. C. Dutton and L. Spragins have worked to prepare a draft for circulation, with the scopes of both standards encompassed in a single document to eliminate much data now duplicated several times in the existing standards. Minor changes are also proposed.

ANSI C57.12.2 - TASK FORCE ON DISTRIBUTION TRANSFORMER PRESSURE RELIEF (J.R. Newton)

The former NEMA document NOSPTR-P7-1975 "Design Tests for Fault Current Capability of Overhead Distribtuion Transformer Enclosures" has been published in TR1-1980 as a NEMA standard.

The document was sent to the subcommittee and members were given 30 days for questions, comments, etc. The document is then to be balloted on EEI T&D ballot.

The next meeting of the subcommittee is October 8 and 9, 1981 in Memphis, Tenn.

ANSC C57.12.5 - DRY TYPE TRANSFORMERS (J. C. Dutton)

All documents planned for development by this subcommittee (ANSI C57.12.50-1981, ANSI C57.12.51-1981 and ANSI C57.12.52-1981) have been printed and are available. There were no subcommittee meetings.

ANSI C57.13 - INSTRUMENT TRANSFORMERS (R. C. Thomas)

No report.

ANSI C57.15 - VOLTAGE REGULATORS (A. C. Wurdack)

No Meeting. No report.

ANSI C57.17 - ARC FURNACE TRANSFORMERS (R. D. Morris)

Committee inactive. No report.

ANSI C57.21 - SHUNT REACTORS (S. L. Foster)

Committee inactive. No report.

ANSI C62 - SURGE PROTECTIVE DEVICES (E. J. Adolphson)

ANSI C62.1 is in the process of revision to accommodate the heavy duty distribution arrester and this is being ballotted simultaneously by ANSI and NEMA Surge Arrester section. This revision is also considering the elimination of the expulsion arrester as these are no longer manufactured in the U.S.

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ANSI C68 - TECHNIQUES FOR DIELECTRIC TESTS (L. S. McCormick)

No meeting. No report.

ANSI C76 - BUSHINGS (N. J. Melton)

No meeting. No report.

ANSI C84 - PREFERRED VOLTAGE RATINGS (J. C. Dutton)

1. The work of the C57/C84 Joint AD Hoc Voltage Study Group was successfully completed and the Study Group was discharged with thanks. The results of this work contribute to the revision of ANSI C57.12.10 and ANSI C57.12.30 (now in progress).

2. A meeting of a Joint C84/C92 Task Force was attended on 1/20/81. This meeting discussed voltage definitions and terminology of common interest, and made good progress.

3. The annual meeting of the ANSI C84 Committee was held 6/16/81 and attended by your Liaison Member. Significant subjects discussed included:

   Planned Revision of ANSI C84.1 (Expected in 1982)

   Definitions

   Voltage Unbalance

   Harmonization of Equipment and System Voltages

   DC Voltage

   IEC TC-8 Activities

4. Two ballots concerning revisions in ANSI C84.1 have been received and voted affirmatively.

ANSI C89 - SPECIALTY TRANSFORMERS (S. J. Antalis)

1. No ANSI C89 meetings have been held in 1981.

2. ANSI C89.1 — "Specialty Transformers (except General Purpose Type)" has been reaffirmed by the ANSI Board of Standards Review on August 27, 1981.

3. ANSI C89.2 -- Dry Type Transformers for General Applications" is being submitted to the ANSI Board of Standards Review for final approval, at their scheduled October 15, 1981 meeting.

   With the publication of ANSI C57.12.50, .51, and .52, the NEMA ST-8 Dry Type and Specialty Transformer Section will review the present overlap of the high voltage portion of C89.2 with ANSI C57.12.5 at their annual meeting in November. (ANSI C89.2 presently covers both general purpose and power transformers 600V and below, as well as high voltage transformers to 15KV, 500kVA.)

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ANSI C92 - INSULATION COORDINATION (J. C. Dutton)

1. There was an annual meeting of ANSI C92 on 11/6/80 which your Liaison Member was unable to attend.

2. A joint meeting of a C84/C92 Task Force was attended on 1/20/81. This meeting discussed voltage definitions and terminology of common interest, and made good progress.

3. The following C92 Standards are in preparation, and are understood to be nearing completion:

   ANSI C92.1 (Insulation Coordination)

   ANSI C92.2 (Voltage Levels)

4. Mr. J. J. Kark, Secretary of the ANSI C92 Committee, died August 22, 1981 of an apparent heart attack.

IEEE JOINT COMMITTEE ON NUCLEAR POWER STANDARDS (L. R. Stenslund)

1. Attended the SC-2 meeting in Denver, September 16 and 17, 1981.

2. The IEEE Standard for accreditation of organizations that conduct qualifiction testing of equipment for use in nuclear power generating stations (P600 draft 2) was reviewed. A number of comments had been received by the Working Group that were policy questions as well as technical comments. Draft 3 was issued on September 28 which incorpoarted some of the comments the W.G. had received. The Steering Committee is providing responses to policy questions by separate letter.

3. I gave the liaison report for P638 draft 10.1 IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations. I mentioned we are having an interim meeting in Phoenix on September 16 and 17, 1981 to review the negative ballots received from the SC-2 earlier this year.

4. The next SC-2 meeting is scheduled for January 19 and 20, 1982 in Dallas, Texas.

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REPORT OF ACTIVITIES IN CIGRE SC-12 - TRANSFORMERS

(W.J. McNutt - U.S. Representative to CIGRE SC-12)

The United States served as host to a Colloquium of CIGRE Study Committee 12 (Transformers) at the Hyatt Regency Hotel in Cambridge, Mass. from September 3-8, 1981. The event was attended by 75 delegates from 20 nations plus 35 accompanying guests. There were three major discussion subjects:

"Determination of Transformer Condition and Preventative Maintenance in Service"

"Overloading and Loading Limitations of Large Transformers"

"Trends in Design and Operation of Large Power Transformers and Shunt Reactors"

In each set of discussions there were several keynote speakers who addressed some major aspect of the subject to set the foundations for free discussion. During the third discussion day the Electric Power Research Institute and the U.S. Department of Energy provided much of the subject material from research projects which they have sponsored. In addition to the three discussion sessions there was also a very well organized and conducted technical visit to the Northfield Pumped Hydro project of Northeast Utilities.

Items of special note from the discussions include the following:

1. A budding interest in Europe in continuous removal of moisture and/or gas from operating transformers.

2. Progress on development of direct measurement of transformer conductor hot-spots. Devices appear to be approaching a stage where service trials could be conducted in both the U.S. and Europe.

3. Several European speakers echoed the growing feeling in the U.S. that the principal transformer overload concern should be for known short-term risk effects (bubbles, transient reduction in dielectric or mechanical strength) rather than for the long-term insulation deterioration ("Loss of Life").

4. Suggestions that better thermal measurement techniques during heat-runs and better thermal calculation techniques for loading guides are needed.

5. In the U.S. advance technology work in amorphous core steel, vaporization cooling, and gas insulation is being pursued much more actively than in foreign countries.

6. Abroad the development of transformers for Ultra High Voltage systems is being more actively pursued than in the U.S. In the U.S.S.R., Japan, and Italy large MVA UHV prototypes (or multiple units) have already been built.

4.0

Several brief Working Group reports were given. Most noteable was that of the Reliability W.G. which has just completed a worldwide (13 nations) survey of transformer service performance. 47000 unit years of service were reported with over 1000 unit failures. Trends observed were:

1. Increased failure rate with voltage level.

2. Higher failure rate for units with on-load tap changing.

3. Overall failure rates increasing with time. (i.e. - 1978 rates higher than 1968.)

The final report will be published within the next year.

At the SC-12 meeting following the colloquium preferential subjects for the 1984 Paris meeting were discussed and about 10 candidates were proposed. While the final selection will not be made until next year, preference seemed to be given to:

"Thermal Problems in Transformers in Service"

and

"Performance and Application Problems Associated with Bushings"

Judging from the response of the 90 or so international guests who participated in the technical and social activities of this U.S. hosted Transformer Colloquium it must be regarded as a very successful event. All were impressed with the hospitality that was shown to them. As the U.S. Representative to SC-12 I am very grateful to the 15 organizations which, in addition to the U.S. National Committee, served as co-sponsors. Through their generous response to my appeal for funds I was able to raise $30,000 to defray expenses, which was in excess of the actual expenses of approximately $25,000. The net balance after all bills are paid will be returned to the U.S. National Committee.

4.1 EPRI Liaison Report - E. T.Norton

Mr. Norton reported on a new 5 horsepower pump used on FOA transformers designed by Mechanical Technologies of Latham, New York. The features of this design are that (1) it is totally enclosed, (2) has large bearing clearances, (3) any debris or contaminants in the pump can be trapped and will be retained in the casing rather than flowing into the transformer, and (4) it is of an axi-symmetric design with balance hydraulic features.

This design has an objective of improving pump relaibility. After a prototype is built, coordination with Cardinal Development will be pursued for possible manufacture. Mr. Norton asked for utility participation in evaluating the prototypes.

A question was raised as to the suitability of using nylon in hot oil. Ed responded that the nylon material would have to be suitable for transformer operation. Also asked was the relative efficiency of the new pump with present designs. Ed noted that the design was of the same rhlative efficiency. A question on whether or not the impeller could be reduced without affecting the pump characteristics. Ed was not sure of this point and indicated it would have to be checked.

Also questions was the original reason why this pump design was developed with sponsorship by EPRI. Ed noted that thtis was selected as a result of and EEI Reliability Report that indicated high pump failure rates.

4.2 DOE Report - Jit Vora

No report.

4.3 HVACC Liaison Report - E. Huber

W. McNutt reported that E. Huber had no report.

J. Bergeron brought up a question regarding HVACC Liaison Report on Working Group 12 on substations. He questioned if the rated short circuit current (carrying) section had been reviewed by the Transformers Committee.

J. Dutton indicated that a HVACC document under C37 was issued for public review with an invitation to comment in writing to ANSI which included this section. The document is very switchgear oriented. John Bergeron then indicated that further liaison is required with switchgear on this matter.

Olin Compton then asked at what point could the Transformers Committee cast a negative ballot on this document. It was decided that since the Transformers Committee did not have representation, comments must come individually.

5.0 Technical Papers for Future IEEE-PES Meetings

See Administrative Subcommittee Section 3.0 for this report.

6.0 New Business

C. Honey questioned if the IEEE could work on transformer damage caused by shipping. R. Smith supported this proposal. Otto Keller noted that transformers must be engineered for transportation. No specific action on this question was taken.

G. Iliff noted that C92 was about to publish C92.1 on insulation coordination and asked J. Dutton if in fact this document was infringing on the Transformers Committee province. John Dutton indicated that this was a general document on insulation coordination. The document was sent to ANSI for approval and publication, but ANSI required another public review and re-balloting by C92. John indicated he accepted this ballot. The document has preferred numbers for basic switching surge levels which are different than that in the Transformers Committee, but their is a note covering this point.

The meeting adjourned at 11:07 a.m.

Respectfully submitted,

D. A. Yannucci
IEEE Transformers Committee