

**IEEE
TRANSFORMERS COMMITTEE**

MEETING MINUTES

*November 1, 1989
Charlotte, North Carolina*

MEMBERS PRESENT

| | | |
|------------------------|-----------------------|-----------------|
| B.F. Allen | E.K. Koenig | D.E. Truax |
| E.H. Arjeski | J.G. Lackey | W.B. Uhl |
| J.C. Arnold | R.E. Lee | R.E. Uptegraff |
| D. Basel | R.H. Hollister | G. Vaillancourt |
| J.J. Bergeron | L.A. Lowdermilk | R.A. Veitch |
| W.B. Binder | M.L. Manning | L.B. Wagenaar |
| J.V. Bonucchi | J.W. Matthews | R.J. Whearty |
| J.D. Borst | S.P. Mehta | W.E. Wrenn |
| C.V. Brown | R.E. Minkwitz | A.C. Wurdack |
| O.R. Compton | H.R. Moore | |
| F.W. Cook | W.H. Mutschler | |
| J. Cockran | C.J. McMillen | |
| D.W. Crofts (Don Rose) | W.J. McNutt | |
| J.N. Davis | E.T. Norton | |
| D.H. Douglas | B.K. Patel | |
| J.A. Ebert | W. Patterson | |
| D.J. Fallon | H.A. Pearce | |
| M. Frydman | L.W. Pierce | |
| D.W. Gerlach | J.M. Pollitt | |
| R.E. Gearhart | C.T. Raymond | |
| R.L. Grubb | C.A. Robbins | |
| F.J. Gryszkiewicz | V. Shenoy (V. Sankar) | |
| G. Hall (Dennis Orten) | W.E. Saxon | |
| J.H. Harlow | D.N. Sharma | |
| F.W. Heinrichs | W.W. Stein | |
| W. Henning | L.R. Stensland | |
| K.R. Highton | L. Swenson | |
| E. Howells | D.S. Takach | |
| D.L. Johnson | A.L. Tanton | |
| A.J. Jonnatti | V. Thenappan | |
| C.P. Kappeler | R.C. Thomas | |
| W.N. Kennedy | J.A. Thompson | |
| J.P. Kinney | T.P. Traub | |
| R. Allustiarti | M. Altman | |
| M.I. Mitelman | W.E. Morehart | |
| J.W. McGill | | |

Member Attendance Summary

| | Present | Absent |
|----------------|---------|--------|
| Members | 80 | 44 |
| Voting Members | 80 | 31 |

MEMBERS ABSENT

E.J. Adolphson
L.C. Aicher
D.J. Allan
J. Aubin
R. Bancroft
D.A. Barnard
P.L. Bellaschi
S. Bennon
D.J. Cash
R.F. Dudley
J.C. Dutton
J.K. Easley
S.L. Foster
H.E. Gabel
D.A. Gillies
P.J. Hoefler
C.R. Hoesel
C.C. Honey
C. Hurty
G.W. Iliff
A.M. Iversen
R.G. Jacobsen
D.C. Johnson
J.J. Kelly
B. Klaponski
A.D. Kline
H.F. Light
L.W. Long
R.I. Lowe
H.B. Margolis
Titto Massouda
C.K. Miller
C. Millian
R.J. Musil
R.A. Olsson
D. Perco
L.J. Savio
R.B. Stetson
E.G. Strangas
D.W. Sundin
A.M. Teplitzky
A. Wilks
D.A. Yannucci
E.J. Yasuda

GUESTS

DAVID ROLLING
CHARLES R. MURRAY
MARK D. PERKINS
JACK RODDEN
G.E. FORREST
G. LACASSE
D.E. ORTEN
GEORGE TOLBERT
DAVIS PARR
DONALD LOWE
RONALD FOX
CHARLES W. JOHNSON
JOHN S. HURST
J.L. AKERS
M. BEAULIEU
M. CAMBRE
W.J. CARTER
DON W. ROSE
R.L. GRUNERT
P. IIJIMA
C.E. KIRSCH
W. KRUESI
J.J. NAY
L. NICHOLAS
V.Q. PHAM
G.P. PREGENT
P. RIFFON
J. ROSSETTI
V.S. SANKAR
S.D. SMITH
J.A. TINGEN
J. ANTWEILER
S.W. ARNOLD
A. RIZVI
B.L. BEASTER
T.L. BOWERS
T.F. BRENNEN
J.C. CROUSE
V. DAHINDEN
H.G. FISCHER
R. GARCIA
S.P. KENNEDY
G. KRAUSE
F.A. LEWIS
S. LINDGREN
K.R. LINSLEY
M.M. MCGEE
H.P. MOSER

J. PATTON
D.W. PLATTS
G.J. REITTER
P. SINGH
H.D. SMITH
F.E. WILLET
H.J. WINDISCH

IEEE PES TRANSFORMERS COMMITTEE
MEETING MINUTES
CHARLOTTE, NC - NOVEMBER 1, 1989

Chairman Robert Veitch opened the meeting at 8:00 a.m. by welcoming attendees to the session. This was followed by self introductions by all attendees.

Chairman's Remarks and Announcements - Robert Veitch

1. The Chairman thanked Charlotte hosts Bill and Judy Saxon for the excellent meeting arrangements. 197 members and guests were registered along with 42 spouses.
2. The Chairman asked host Saxon to convey the Committee's appreciation to Jim Hicks (Duke Power T&D V.P.) for his luncheon presentation.
3. Future Meetings:

| | | | | |
|---------------|-----------|----------|-------------|---------------------|
| 1990 - Spring | Denver | 3/25-28 | Marriott | Felix Cook |
| 1990 - Fall | Montreal | 10/21-24 | Bonaventure | George Vaillancourt |
| 1991 - Spring | Phoenix | | | Dennis Gerlach |
| 1991 - Fall | Baltimore | | | J.Pollit/J.Matthews |

Locations selected for 1992 and 1993 meetings (pending host company approval) are as follows:

| | | |
|---------------|---|--------------------------|
| 1992 - Spring | Birmingham | Bipin Patel/ Aslam Rizvi |
| 1992 - Fall | Cleveland | Dave Douglas |
| 1993 - Spring | Western Location (to be determined by Dennis Gerlach) | |
| 1993 - Fall | St. Petersburg Area | Jim Harlow |

4. Membership

New members of the Main Committee were announced as follows:

Bruce Uhl - Commonwealth Edison
Bob Gearhart - GE
Richard Dudley - Trench Electric

With these additions, Main Committee membership is 124 including:

13 Emeritus Members
111 Voting Members
[26 General Interest (23%)
40 Users (36%)
45 Producers (41%)]

Approval of Minutes of April 12, 1989 - Robert Veitch

The minutes were approved as issued. It was later brought to the Secretary's attention that Bill Wrenn and Wally Binder had been incorrectly listed as absent at the April 12 meeting.

Reports of Subcommittees

Administrative - Robert Veitch

The Administrative Subcommittee minutes are attached (TC-B)

Chairman Veitch reviewed his Chairman's Report (Attachment ASC-E) which includes highlights from the July PES Technical Council meeting. Noted were procedural modifications for general meeting session scheduling, technical paper classification/approval, presentation requirements and panel session requirements.

Transformer Committee scope changes were reviewed (Attachments ASC-E and ASC-B). A revised Committee Operating Manual will be issued after scope approvals are obtained.

Audible Sound and Vibration - Len Swenson for Allen Teplitzky

Mr. Teplitzky's report is Attachment TC-C.

Bushings - Loren Wagenaar

Mr. Wagenaar's report is Attachment TC-D.

HVDC Converter Transformers and Smoothing Reactors - Bill Kennedy

Mr. Kennedy's report is Attachment TC-E.

Mr. Kennedy also presented his CIGRE SC-12 Liaison Report (Attachment TC-F). He noted high utilization of hot spot measuring devices in Europe.

Dielectric Tests - Robert Lee

Mr. Lee's report is Attachment TC-G.

Dry-Type Transformers - Roy Uptegraff

Mr. Uptegraff's report is Attachment TC-H.

Instrument Transformers - John Davis

Mr. Davis' report is Attachment TC-I.

Instrument Transformers - Henry Pearce

Mr. Pearce's report is Attachment TC-J.

Insulation Life - Dave Douglas

Mr. Douglas' report is Attachment TC-K.

Performance Characteristics - John Matthews

Mr. Matthews' report is Attachment TC-L.

Recognition and Awards - Robert Veitch for Dean Yannucci

Mr. Yannucci's report is Attachment ASC-J.

Transformer Standards - Jim Harlow

Mr. Harlow's status report is Attachment ASC-D; there are currently 52 active projects. Also included is a listing of standards submittals; IEEE has begun the practice of publishing many of these as IEEE documents pending C57 and ANSI approval. It was noted that 9 Transformers Committee ballots can be anticipated prior to the Spring Meeting.

The August 1989 Standards Board meeting is also reviewed in Mr. Harlow's report.

West Coast - Dennis Gerlach

Mr. Gerlach's report is Attachment TC-M.

In response to question from the floor, Mr. Gerlach reported little evidence of transformer damage reported as a result of the recent earthquake.

Reports of Liaison Representatives

EPRI - Stan Lindgren

Mr. Lindgren's report is Attachment TC-N.

Mr. Lindgren also reported information concerning the recent "seismic withstand test" (earthquake).

Other Liaison Reports

Note Attachment TC-F previously discussed by Mr. Kennedy.

Technical Papers - John Bergeron

Mr. Bergeron's report is Attachment ASC-I; he noted lack of attendance at Transformers Sessions and urged that practical papers be encouraged to improve attendance.

Ed Norton suggested that poster sessions be considered for improving attendance.

Len Pierce suggested making the list of approved papers available to Committee members prior to the General Meetings. Mr. Bergeron agreed to pursue this.

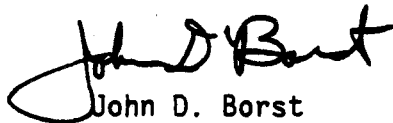
New Business

Len Pierce noted that a manufacturer plant tour notice was included in the invitation mailing on a selected basis; he questioned the appropriateness of this action. A variety of opinions were offered. Chairman Veitch felt that a separate mailing would have been the proper approach; he will review this with the PES Technical Council.

The use of fax numbers on rosters and ballots to expedite communications was suggested by Ed Norton. It was agreed that this was acceptable and should be encouraged.

There being no further new business, the meeting was adjourned at 11:05 a.m.

Respectfully submitted,


John D. Borst
Secretary

ATTACHMENTS LIST
Charlotte Meeting

TC-A Schedule of meetings
TC-B Administrative Subcommittee Minutes - Borst

ASC-A Administrative Subcommittee Agenda
-B Revised Scope Statements
-C Recognition and Awards Scope
-D Standards Subcommittee Report - Harlow
-E Committee Chairman's Report - Veitch
-F Insulating Fluids Subcommittee Report - Pearce
-G PCS Report - Matthews
-H Dielectric Tests Subcommittee Report - Lee
-I Technical Papers Report - Bergeron
-J Awards Subcommittee Report - Yannucci

TC-C Audible Sound and Vibration Subcommittee Minutes - Teplitzky
TC-D Bushing Subcommittee Minutes - Wagenaar
TC-E HVDC Converter Transformers and Smoothing Reactors Subcommittee
Minutes - Kennedy

TC-F CIGRE SC-12 (Transformers) Liaison Report - Kennedy
TC-G Dielectric Tests Subcommittee Minutes - Lee
TC-H Dry-Type Transformers Subcommittee Minutes - Uptegraff
TC-I Instrument Transformers Subcommittee Minutes - Davis
TC-J Insulating Fluids Subcommittee Minutes - Pearce
TC-K Insulation Life Subcommittee Minutes - Douglas
TC-L Performance Characteristics Subcommittee Minutes - Matthews
TC-M West Coast Subcommittee Minutes - Gerlach
TC-N EPRI Liaison Report - Lindgren

TC-A
1 OF 5

October 23, 1989

IEEE/PES TRANSFORMERS COMMITTEE
SCHEDULE OF MEETINGS
MARRIOTT CITY CENTER HOTEL
OCTOBER 29 - NOVEMBER 1, 1989

| <u>DATE AND TIME</u> | <u>CHAIRMAN/ACTIVITY</u> | <u>LOCATION</u> |
|--|--------------------------|-----------------|
| <u>SUNDAY, OCTOBER 29, 1989</u> | | |
| <u>2:00 P.M. - 5:30 P.M.</u> | | |
| REGISTRATION | W. E. Saxon | Level 3 |
| <u>3:00 P.M. - 5:00 P.M.</u> | | |
| T.F. Dry-Type Transformers C57.12.91 | Uptegraff-Hollister | Boardroom 1 |
| T.F. Dry-Type Transformers C57.12.91 | Rodden-Pearce | Boardroom 2 |
| T.F. Dry-Type Transformers C57.12.91 | Mutschler-Iversen | Myers Park |
| <u>6:00 P.M. - 8:00 P.M.</u> | | |
| | Hospitality Reception | Salon E |
| <u>MONDAY, OCTOBER 30, 1989</u> | | |
| 7:00 A.M. - 8:00 A.M. | Continental Breakfast | Salon E |
| 8:00 A.M. - 5:00 A.M. | Registration | Level 3 |
| 8:00 A.M. - 10:00 A.M. | Spouses' Hospitality | 16th Floor |
| | Continental Breakfast | Pompano's |
| <u>8:00 A.M. - 9:50 A.M.</u> | | |
| T.F. Loss Measurement Guide | R. S. Girgis | Salon A |
| W.G. Guide for Loading Oil Filled Transformers | W. E. Wrenn | Salon B |
| Insulating Fluids Subcommittee | H. A. Pearce | Salon C |
| HVDC Converter Transf. and Reactors Subcommittee | W. N. Kennedy | Salon F |
| T.F. Semi-Conductor Rectifier Transformers - Harmonic Load Heating | C. G. Pounds | Cancelled |
| T.F. - Low Side Surge Requirements for Distribution Transformers | R. E. Lee | Salon H |
| T.F. Measurements of Apparent Charge | W. J. Carter | Myers Park |

TC-A
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MONDAY, OCTOBER 30, 1989 (Cont.)

| | | |
|---|---------------------|------------------------|
| <u>9:50 A.M. - 10:05 A.M.</u> | Coffee Break | Outside Salon C & F |
| <u>10:05 A.M. - 12:00 Noon</u> | | |
| T.F. Acoustic Detection of Partial Discharges | E. Howells | Salon A |
| Insulating Fluids Subcommittee | H. A. Pearce | Salon C |
| W.G. Cast Coil Dry-Type Std. | E. Koenig | Salon B |
| W.G. Qualification of Class 1E Transformers for Nuclear Power Generating Stations | L. R. Stensland | Myers Park |
| T.F. Semi-Conductor Rectifier Transformers - Harmonic Load Heating | C. G. Pounds | Salon G |
| T.F. Revision of Impulse Test Guide | R. E. Minkwitz | Salon F |
| W.G. Dry-Type Reactors | R. F. Dudley | Salon H |
| <u>12:00 Noon - 1:00 P.M.</u> | Lunch (on your own) | |
| <u>1:00 P.M. - 2:50 P.M.</u> | | |
| W.G. Revision of Dielectric Tests for Distribution Transformers | J. Rossetti | Salon A |
| W.G. Revision of Dielectric Tests for Shunt Reactors | W. N. Kennedy | Salon B |
| W.G. Failure Analysis Guide | D. J. Cash | Salon C |
| W.G. Insulation Requirements for Specialty Transformers | A. M. Iversen | Salon F |
| W.G. Bushing - DC Applications | L. B. Wagenaar | Salon G |
| W.G. Consolidation of Installation Guides | D. A. Gillies | Salon H |
| W.G. Gas Analysis During Factory Tests | J. P. Kinney | Myers Park |
| <u>2:50 P.M. - 3:05 P.M.</u> | Coffee Break | Outside Salon C & F |
| <u>3:05 P.M. - 5:00 P.M.</u> | | |
| W.G. LTC Performance Requirements | T. P. Traub | Salon A |
| W.G. Loss Tolerances and Measurements | W. Henning | Salon B |
| W.G. Thermal Tests | R. L. Grubb | Salon C |
| W.G. Revision of Test Code for Shunt Reactors | J. W. McGill | Salon F |
| W.G. Revision Dielectric Tests | H. R. Moore | Salon G |
| W.G. Dry-Type Thermal Problems | W. H. Mutschler | Salon H |
| W.G. Dry-Type Dielectric Problems | A. D. Kline | Myers Park |

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MONDAY, OCTOBER 30, 1989 (Cont.)

6:00 P.M. - 10:30 P.M.

Administrative Subcommittee R. A. Veitch Myers Park

TUESDAY, OCTOBER 31, 1989

7:00 A.M. - 8:00 A.M.

Continental Breakfast Salon E

8:00 A.M. - 1:00 P.M.

Registration Level 3

8:00 A.M. - 10:00 A.M.

Spouses' Hospitality 16th Floor

Continental Breakfast Pompano's

8:00 A.M. - 9:50 A.M.

W.G. Partial Discharge Tests
Insulating Fluids Subcommittee
W.G. Bushing Application Guide
W.G. Thermal Evaluation of
Distribution and Power Trans.
Instrument Trans. Subcommittee

G. Vaillancourt

Salon D

H. A. Pearce

Salon A

F. Elliott

Salon F

L. A. Lowdermilk

Salon G

J. N. Davis

Salon H

9:50 A.M. - 10:05 A.M.

Coffee Break

Outside

Salon C & F

10:05 A.M. - 11:15 A.M.

Dielectric Tests Subcommittee
Insulating Fluids Subcommittee
Audible Sound & Vibration Sub.
Instrument Trans. Subcommittee
West Coast Subcommittee

R. E. Lee

Salon D

H. A. Pearce

Salon A

A. M. Teplitzky

Salon B

J. N. Davis

Salon H

D. W. Gerlach

Salon C

11:15 A.M. - 12:25 P.M.

Performance Characteristics
Subcommittee
Bushing Subcommittee
Insulating Fluids Subcommittee
W.G. Thermal Evaluation of
Insulating Systems of Dry
Type Transformers Above
600 Volts

J. W. Matthews

Salon D

L. B. Wagenaar

Salon B

H. A. Pearce

Salon A

R. L. Provost

Salon C

Instrument Trans. Subcommittee
Audible Sound & Vibration Sub.

J. N. Davis

Salon H

A. M. Teplitzky

Salon F

12:30 P.M. - 1:45 P.M.

Luncheon

Salon E

TUESDAY, OCTOBER 31, 1989 (Cont.)

1:50 P.M. - 3:00 P.M.

| | | |
|---|-----------------|---------|
| Insulation Life Subcommittee | D. H. Douglas | Salon D |
| Dry-Type Transformers Subcommittee | R. E. Uptegraff | Salon A |
| Instrument Transformers Subcommittee | J. N. Davis | Salon H |
| Bushing Subcommittee | L. B. Wagenaar | Salon B |
| *T.F. Low Side Surge Require- ments for Distribution Transformers | R. E. Lee | Salon C |

3:10 P.M. - 5:00 P.M.

| | | |
|---|-------------|---------|
| Seminar "Experiences with Digital Recording During Production Impulse Tests" | H. R. Moore | Salon D |
|---|-------------|---------|

WEDNESDAY, NOVEMBER 1, 1989

7:00 A.M. - 8:00 A.M.

| | |
|-----------------------|---------|
| Continental Breakfast | Salon C |
|-----------------------|---------|

8:00 A.M. - 9:30 A.M.

| | |
|---|-------------------------|
| Spouses' Hospitality Continental Breakfast | 16th Floor Pompano's |
|---|-------------------------|

8:00 A.M. - 9:50 A.M.

| | | |
|------------------------|--------------|---------|
| Transformers Committee | R. A. Veitch | Salon D |
|------------------------|--------------|---------|

9:50 A.M. - 10:05 A.M.

| | |
|--------------|--------------------|
| Coffee Break | Outside Salon D |
|--------------|--------------------|

10:05 A.M. - 12:00 P.M.

| | | |
|------------------------|--------------|---------|
| Transformers Committee | R. A. Veitch | Salon D |
|------------------------|--------------|---------|

12:00 Noon

Hotel Checkout

*Continuation of Monday 8:00 A.M. Session, if required.

IEEE/PES Transformers Committee Meeting
Wednesday, November 1, 1989

Chairman: R. A. Veitch

Vice Chairman: J. J. Bergeron

Secretary: J. D. Borst

1. Chairman's Remarks and Announcements R. A. Veitch
2. Approval of Minutes of April 12, 1989 R. A. Veitch
3. Report of Subcommittees:
 - 3.0 Administrative R. A. Veitch
 - 3.1 Audible Sound and Vibration A. M. Teplitzky
 - 3.2 Bushing L. B. Wagenaar
 - 3.3 HVDC Converter Transformers & Reactors W. N. Kennedy
 - 3.4 Dielectric Tests R. E. Lee
 - 3.5 Dry-Type Transformers R. E. Uptegraff
 - 3.6 Instrument Transformers J. N. Davis
 - 3.7 Insulating Fluids H. A. Pearce
 - 3.8 Insulation Life D. H. Douglas
 - 3.9 Performance Characteristics J. W. Matthews
 - 3.10 Recognition and Awards D. A. Yannucci
 - 3.11 Transformer Standards J. H. Harlow
 - 3.12 West Coast D. W. Gerlach
4. Reports of Liaison Representatives:
 - 4.1 EPRI S. R. Lindgren
 - 4.2 Discussion of Other Liaison Reports
5. Technical Papers for Future IEEE/PES Meetings J. J. Bergeron
6. New Business

2WES.REG/cgf

TC-B
1 of 5

IEEE TRANSFORMERS COMMITTEE
ADMINISTRATIVE SUBCOMMITTEE
OCTOBER 30, 1989
CHARLOTTE, NORTH CAROLINA

1. INTRODUCTION

Chairman Robert Veitch opened the meeting at 6:50 p.m. with 14 members and 4 guests present.

| | | |
|-----------------|----------------|-----------------|
| Members: | John Bergeron | Robert Lee |
| | John Borst | John Matthews |
| | John Davis | Henry Pearce |
| | Dave Douglas | Allan Teplitzky |
| | Jim Harlow | Roy Uptegraff |
| | Dennis Gerlach | Loren Wagenaar |
| | Bill Kennedy | Robert Veitch |

| | | |
|----------------|----------------|--------------|
| Guests: | William Kruesi | Olin Compton |
| | Felix Cook | Bill Saxon |

2. MINUTES

The minutes of the Chicago meeting were approved as previously submitted.

3. AGENDA

The proposed agenda (Attachment ASC-A) was approved as submitted.

4. MEETING ARRANGEMENTS

As of Monday night, 200 people (plus 42 spouses) were registered for the Charlotte meeting. The Tuesday luncheon will feature a presentation by Jim Hicks (T&D V.P. - Duke Power) on the damage and restoration of service following Hurricane Hugo. The Subcommittee expressed its appreciation to host Bill Saxon for the excellent meeting arrangements.

Denver meeting host Felix Cook confirmed the arrangements for the March 25-28, 1990 meeting at the downtown Marriott (room rate of \$88/night).

Future Meetings:

| | | | | |
|---------------|-----------|-----------|-------------------|-----------------------|
| 1990 - Spring | Denver | 3/25-28 | Marriott | Felix Cook |
| 1990 - Fall | Montreal | 10/21-24 | Bonaventure | George Vaillancourt |
| 1991 - Spring | Phoenix | | Mission Palms | Dennis Gerlach |
| 1991 - Fall | Baltimore | 11/3-11/6 | Omni Inner Harbor | J. Pollit/J. Matthews |

Locations selected for 1992 and 1993 meetings (pending host company approval) are as follows:

| | | | |
|---------------|---|-------------------------------------|-------------------------|
| 1992 - Spring | Birmingham | <i>week of March 29 or April 12</i> | Bipin Patel/Aslam Rizvi |
| 1992 - Fall | Cleveland | | Dave Douglas |
| 1993 - Spring | Western Location (to be determined by Dennis Gerlach) | | |
| 1993 - Fall | St. Petersburg Area | | Jim Harlow |

5. OPERATING MANUAL STATUS (Robert Veitch for Leo Savio)

New scope statements (Attachment ASC-B) have been developed for the Main Committee and the recently added HVDC Converter Transformer and Smoothing Reactor Subcommittee. Approval is pending at the PES Technical Council, Organization and Procedures Committee.

A section on recognition and awards (Attachment ASC-C) developed by Dean Yannucci was presented for inclusion and was approved by Subcommittee vote (moved by Olin Compton and seconded by Henry Pearce).

Following O&P Committee approval, the revised Transformers Committee Operating Manual will be published.

6. STANDARDS ACTIVITIES

Jim Harlow reviewed highlights of Transformer Standards Status Report (Attachment ASC-D); Subcommittee Chairmen are requested to review project status for accuracy. Also included is a status of standards submittals; it was noted that several submittals have been published as IEEE Standards pending C57 and ANSI approval.

The trial use period for C57.113 (Trial Use Guide for Partial Discharge Measurements in Liquid-Filled Power Transformers and Shunt Reactors) is due to expire on 2/28/90. After review within the Dielectric Tests Subcommittee, a Transformers Committee ballot will be conducted to elevate C57.113 to full status as a Guide.

Per Bill Kruesi, IEEE Headquarters is seeking methods to streamline the standards approval and publication process.

It was noted that the ANSI C57 Committee will meet on Nov. 1, 1989 at the Duke Power Office in downtown Charlotte.

7. TECHNICAL COUNCIL ACTIVITIES AND CHAIRMAN'S REPORT

Chairman Robert Veitch submitted his report (Attachment ASC-E) and reviewed highlights which include:

- a. A "Master Plan" has been adopted for General Meeting Session scheduling; the Transformers Committee Session will be Wednesday afternoons.
- b. Joint sessions between/among Committees will be held to assure full sessions.
- c. The "Conference Paper" classification has been re-introduced.
- d. Review and approval of presentation visuals is now required; use of overhead projectors will be allowed.
- e. Greater control will be exercised over Panel Sessions.

8. TECHNICAL SUBCOMMITTEE ACTIVITY

a. West Coast

Chairman Dennis Gerlach reviewed progress on active projects; in response to a question, he indicated that no report was yet available concerning transformer seismic performance during the recent earthquake.

b. Insulating Fluids

Chairman Henry Pearce submitted a summary of activities (Attachment ASC-F); he noted that further revision of C57.104 (Gas Guide) is required prior to additional Transformer Committee ballot.

c. Performance Characteristics

Chairman John Matthews submitted a summary of activities (Attachment ASC-G).

Chairman Veitch expressed concern with the lengthy approval process for P638 (Qualification of Transformers for Class 1E Application).

d. Insulation Life

Chairman Dave Douglas initiated discussion on terminology usage: "oil-immersed" vs. "fluid-immersed". The Subcommittee agreed that the more general term, "fluid-immersed", is the preferred usage.

e. Dielectric Tests

Chairman Bob Lee submitted a summary of activities (Attachment ASC-H).

A question was raised concerning reimbursing retirees for committee-related administrative expenses; the Subcommittee agreed that the preferred solution is to find reimbursed sources within the membership.

Chairman Lee also noted that a PAR will be submitted to develop an Impulse Test Guide for Distribution Transformers.

f. Audible Sound and Vibration

Chairman Allan Telpitzky indicated that the Test Code should shortly be ready for Transformers Committee ballot.

g. Bushings

Chairman Loren Wagenaar discussed progress on active projects.

A replacement for John Easley as Technical Advisor to IEC 36 is being sought.

h. HVDC Converter Transformers and Smoothing Reactors

Chairman Bill Kennedy indicated that their PAR will be revised and resubmitted to not exclude dry-type smoothing reactors.

i. Instrument Transformers

Chairman John Davis reviewed project status.

The inactivity on C37.077 (a joint project with the Switchgear Committee) was questioned; the IEEE office and/or the Switchgear Committee will be contacted for a status update.

j. Dry Type

Chairman Roy Uptegraff indicated that the Standards Status Report was essentially accurate for his subcommittee.

He noted reported occurrences of high hot spot temperatures apparently due to loads having high harmonic content.

9. TECHNICAL PAPERS

Vice-Chairman John Bergeron submitted and reviewed his report on technical paper activities (Attachment ASC-I). He noted that recent Transformers Sessions have been poorly attended.

10. COMMITTEE MEMBERSHIP REVIEW

New members of the Main Committee were approved as follows:

Bruce Uhl - Commonwealth Edison
Bob Gearhart - GE
Richard Dudley - Trench Electric

With these additions, Main Committee membership is 124 including:

13 Emeritus Members
111 Voting Members
[26 General Interest (23%)
40 Users (36%)
45 Producers (41%)]

11. AWARDS

Bill Kennedy submitted an Awards Summary for Dean Yannucci (Attachment ASC-J).

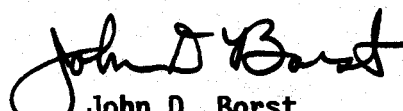
12. OLD BUSINESS

Chairman Veitch reviewed the present list of liaison representatives; several positions remain open. He noted a recent liaison request from the PES T&D Committee on the subject of geomagnetic disturbances.

13. NEW BUSINESS

There being no new business, the meeting was adjourned at 10:20 p.m.

Respectfully submitted


John D. Borst
Secretary

ASC-A

1 OF 2

TO:

October 16, 1989

| | |
|----------------------|---|
| J. J. Bergeron | Vice-Chairman, Transformers Committee |
| J. Borst | Secretary, Transformers Committee |
| O. Compton | Past Chairman |
| A. M. Teplitzky | Audible Sound & Vibration Subcommittee |
| L. B. Wagenaar | Bushing Subcommittee |
| R. E. Lee | Dielectric Tests Subcommittee |
| R. E. Uptegraff, Jr. | Dry-Type Transformers Subcommittee |
| W. N. Kennedy | HVDC Converter Transformers and Smoothing Reactor Subcommittee |
| D. H. Douglas | Insulation Life Subcommittee |
| J. N. Davis | Instrument Transformer Subcommittee |
| J. W. Matthews | Performance Characteristics Subcommittee |
| J. H. Harlow | Standards Committee |
| D. Gerlach | West Coast Subcommittee |
| D. A. Yannucci | P.E.S. Recognition Committee |
| L. Savio | Organization and Procedures Committee |
| W. Saxon | Charlotte Host |
| H. Pearce | Insulating Fluids |
| F. W. Cook, Sr. | Denver Host |

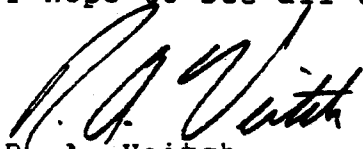
SUBJECT: ADMINISTRATIVE SUBCOMMITTEE MEETING

Attached is the Agenda for our next Adsubcom Meeting to be held Monday, October 30, 1989 at 6:30 p.m. at the Marriott City Center Hotel in Charlotte, N.C. As with past practice, there will be a buffet available for all attending at 6:00 p.m. which should leave sufficient time to begin our meeting promptly at 6:30 p.m. Please note that the Schedule of Meetings sent out incorrectly states that the meeting is scheduled for 7:00 p.m.

As a means of speeding up this meeting, and to assist John Borst with the minutes, I am requesting that all reports be presented in written form. Please try to keep your reports to one page but in no way should they exceed two pages. Twenty copies of your report will be adequate.

If you have any specific items to add to the Agenda (Item 3), please send me a FAX message at (416) 685-9783, or, if you have sufficient time, they can be mailed to me. However, please note that I will not be in my office after October 27.

I hope to see all of you in Charlotte!



R. A. Veitch
Chairman
Transformers Committee

RAV:SH
RAVIEEE2

ASC-A

2 OF 2

I E E E / P E S T R A N S F O R M E R S C O M M I T T E E

Administrative Subcommittee Meeting

Monday, October 30, 1989 @ 6:30 p.m.

Mariott City Center Hotel, Charlotte, North Carolina

A G E N D A

1. Introduction of Members & Guests
2. Approval of the Chicago Meeting Minutes
3. Addition to and/or Approval of the Agenda
4. Committee Finances & Meeting Arrangements
 Bill Saxon - Charlotte Host
 Felix Cook - Denver Host
5. Status of Operating Manual - L. Savio
6. Review of PES Standards Co-ordinating Committee, Standards Projects and other Standards concerns - J. Harlow
7. Review of Technical Council Activities - R. A. Veitch
8. Subcommittees' Activities Discussions - Subcommittee Chairmen
9. Papers for Future Meetings - J. J. Bergeron
10. Committee and Subcommittee Membership Review - J. Borst
11. P.E.S. Awards - D. A. Yannucci
12. Old Business - Liaison Representatives
13. New Business
14. Adjournment

ASC-B

1 OF 1

Page 2 of 2

SCOPE OF TRANSFORMERS COMMITTEE:

Treatment of all matters in which the dominant factors are the application, design, construction, testing and operation of transformers, reactors and other similar equipment. Included is treatment of the following:

- Transmission and distribution transformers
- Reactors and grounding transformers
- HVDC converter transformers and smoothing reactors
- Power semi-conductor rectifier transformers
- Instrument transformers and potential devices
- Insulating fluids
- Insulating and dielectric problems relating to transformers
- Outdoor apparatus bushings

Matters relating to transformers and regulators specifically designed for applications covered by other technical committees, shall be co-ordinated with those committees.

HVDC CONVERTER TRANSFORMER AND SMOOTHING REACTOR SUBCOMMITTEE:

Scope: Study and review engineering aspects of the requirements, design, testing, installation, operation and maintenance of High Voltage Direct Current (HVDC) converter transformers and smoothing reactors. Develop and maintain related standards, recommended practices and guides for such equipment. Co-ordinate with other technical committees, groups, societies and associations as required.

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ASC-C

1 OF 4

Section IB. Scope of Subcommittees

Recognition and Awards Subcommittee

Scope: To annually review the performance of individuals within the transformer committee and to review the quality of working group activities and technical papers sponsored by the committee to determine if IEEE, PES Recognition or Awards are justified.

Section I. IEEE and PES Awards

The transformer committee may annually nominate deserving individuals for the following IEEE and PES awards based on their performance.

Technical Committee Certificate of Appreciation

The transformer committee may nominate and award a framed certificate of appreciation for deserving work performed by a member of the committee. Typical work performed may include chairmanship of the main committee, subcommittee, working group or task force or some other significant contribution to the committee's work.

PES Prize Paper Award

The PES Prize Paper Award will be awarded to the authors of the two most outstanding papers from among those you nominate. Each technical council committee may nominate one paper that must have been published in P&S during the period of September 1, 1986 to August 31, 1989. The award consists of a certificate plaque for each author and a \$200 honorarium for a single author or a \$100 honorarium for each author of each paper, and will be presented at the 1990 PES Summer Meeting Awards luncheon.

PES Working Group Recognition Awards

The PES Working Group Recognition Awards recognize "The most outstanding and timely publications" by a PES Working Group (or committee or subcommittee) from among those you nominate. The PES Recognition Award is separated into two categories: the first, for technical reports, the second, for Standards and Guides. Each technical council committee may nominate one report from each category that must have been published by IEEE during a three-year period prior to August 31. The award consists of a certificate plaque presented to the working group chairman at the PES Summer Meeting Awards luncheon, and a framed certificate presented to each working group member at a meeting of the parent technical committee.

Papers for PES Review

Papers may be nominated for publication in the PES Review. The transformer committee may submit its nomination for prize paper or select a "high interest" paper for this category. These high interest papers must have been published in P&S prior to August 31 of the nominating year.

IEEE Prize Paper Awards

The Transformer Committee may nominate one paper for each of the IEEE awards; W. R .G. Baker, Donald G. Fink, and Browder J. Thompson.

W. R. G. Baker Award

This award is made to the author or authors of the outstanding paper reporting original work in the TRANSACTIONS, JOURNALS, and MAGAZINES of the Societies or in the PROCEEDINGS of the IEEE during the period January 1 - December 31.

Donald G. Fink Award

This award is made to the author or authors of the most outstanding survey, review or tutorial paper in any of the IEEE TRANSACTIONS, JOURNALS, MAGAZINES or PROCEEDINGS during the period January 1 - December 31.

Browder J. Thompson Award

This award is made annually to the author, or joint authors, under thirty years of age at date of submission of original manuscript, for the most outstanding paper published in any of the IEEE publications. All papers by qualified authors published during the period January 1 - December 31 are eligible for consideration for the award. The recipient need not be a member of the IEEE.

Alfred Nobel Intersociety Award

This award is given for a technical paper of exceptional merit accepted for publication in any of the technical publications of the four Founder Societies (AIME, ASCE, ASME and IEEE), and the Western Society of Engineers, provided the author has not passed his 31st birthday at the time the paper is submitted in its final form. The author must be a member of the IEEE. Papers published during the calendar year are eligible. (Papers by joint authors are not acceptable).

Technical Committee Prize Paper Award Recipient

Each technical committee of the technical council is entitled and encouraged to make an award to the author(s) of an outstanding technical paper. This award consists of a medallion mounted on a plaque with a suitable inscription.

ASC-C
4 OF 4

Technical Committee Distinguished Service Award

Each technical committee is entitled and encouraged to make one award for outstanding service. The intent of this personal recognition is to acknowledge the efforts of those individuals whose sustained performance over many years has contributed to the advancement of the committee technology. This award consists of a medallion mounted on a plaque with a suitable inscription.

Technical Committee Working Group Recognition Award

Each technical committee of the technical council is entitled and encouraged to select one working group to be recognized for outstanding performance. This award consists of a medallion mounted on a plaque with a suitable inscription to be presented to the working group chairman. Working group members will receive a certificate with a suitable inscription.

ASC-D

1 OF 8

To: Members of IEEE PES Transformers Committee,
Administrative Subcommittee
October 30, 1989

Subject: Status Report - Transformer Standards.

Following are topics of interest for period April 11, 1989 to October 30, 1989.

1. Active Transformers Committee Projects. A listing of project activity, by subcommittee, is included as attachment.
2. Status of Standards Submittal - The status of standards submissions which have been approved by the Standards Board is included as an attachment.
3. Report from August 1989 Standards Board meeting.
 - a. IEEE Standards Staff appears to be stabilizing. The following persons are our principal contacts.
 - Sue Vogel, Administrator, Society Services (201/562-3817) for general issues not associated with RevCom or NesCom.
 - Terry deCourcelle, Administrator, Standards Board (201/562-3807)
 - Linda Dame (201/562-3806), Secretary, NesCom
 - Janet Pannella (201/562-3808) Secretary, RevCom
 - b. It is sometimes difficult to obtain ballots from bodies identified on the PAR for liason. The following is defined as "minimum acceptable effort," which must be documented.
 - Letter, with copy of final draft of document, is sent to designated liason at time when full committee is balloted.
 - If no response, a second letter is sent 30 days later.
 - If no response, contact by telephone 30 days later.
 - c. Regarding withdrawal of a standard.
 - Withdrawal action has same requirements as reaffirmation action.
 - Requires 50% approval of sponsor, if no negative votes.
 - Requires 75% approval of sponsor if there are any negative votes.
 - Vote can be oral if required percentage of full committee is present for vote; else letter ballot required.

ASC-D

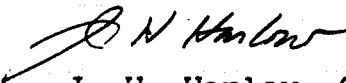
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4. Complete copies of the IEEE Standards Submittal Kits have been distributed to all members of Ad Sub and Working Group Chairmen. Additional copies will be distributed to chairmen of new working Groups when PARs are approved. Adherence to these documents by all working groups will greatly simplify the standards submittal process.
5. Liason with other PES technical committees established in period:

| <u>TC</u> | <u>Project</u> | <u>Liason Representative</u> |
|-----------|---|------------------------------|
| T & D | Guide for Measurement of Radio Noise from the Testing of High Voltage Hardware and Insulators | L. B. Wagenaar |

6. A question has been raised regarding the duplication of much of a non-IEEE standard into an IEEE Standard. Specifically, IEC-214 will form a major basis of PC57.131 for Load Tap Changer requirements. For cases such as this, IEEE has a form to use to request permission to reprint material from copyrighted text. The Chairman of any working group so involved should contact me for the appropriate forms.
7. Mr. Bill Kruesi is with us again in Charlotte as an official representative of the IEEE Standards Office.

Sincerely,



J. H. Harlow, Chairman
Standards Subcommittee

cc: S. Vogel
T. deCourcelle
W. Kruesi

ASC-D

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| Subcommittee: Audible Sound and Vibration | | | | PAR | | |
|--|-------------|------------------------------|--|---------------|--|----------------------------|
| Subcommittee Chairman: Allan M. Teplitsky (212/460-4859) | | | | ON FILE | | |
| IEEE | ANSI | WG/TF | | TRANS | | PES |
| <u>NO.</u> | <u>NO.</u> | <u>CHAIRMAN</u> | <u>IDENTIFICATION</u> | <u>COMM.</u> | <u>AS OF/STATUS</u> | <u>COORD.</u> |
| P523 | PC57.112 | A. Teplitsky | Guide for the Control of Transformer Sound | Yes (8/73) | 4/11/89 - No Report | |
| | PC57.12.90b | A. Teplitsky | Transformer Sound Power Measurement | Yes (3/86) | 4/11/89 Discussion re D7 | RM |
| Subcommittee: Bushing | | | | PAR | | |
| Subcommittee Chairman: Loren B. Wagenaar (614/223-2259) | | | | ON FILE | | |
| IEEE | ANSI | WG/TF | | TRANS | | PES |
| <u>NO.</u> | <u>NO.</u> | <u>CHAIRMAN</u> | <u>IDENTIFICATION</u> | <u>COMM.</u> | <u>AS OF/STATUS</u> | <u>COORD.</u> |
| P21 | PC57.19.00 | L. B. Wagenaar | General Requirements and Test Procedures for Outdoor Apparatus Bushings (Rev. of ANSI C76.1) | Yes (4/79) | 4/11/89 - D8 ballots being resolved. | SWGR T & D PSR IC |
| P800 | PC57.19.100 | F. E. Elliott | Bushing Application Guide | Yes (4/79) | 4/11/89 - D1 comments being resolved. | SWGR SUB PSR |
| | PC57.19.03 | L. B. Wagenaar (Acting) | Standard Requirements, Terminology and Test Code for Bushings for DC Applications | No (pending) | 4/11/89 - D1 review | SPD IC SWGR |
| | | L. D. Miller | TF Bushings for Distribution Transformers | None Required | 4/11/89 - No activity | |
| 24 | PC57.19.01 | L. B. Wagenaar | Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings | No (pending) | 4/11/89 - Comments from sub-committee ballot being resolved. (Tables 9 and 10). | SPD IC SWGR |
| Subcommittee: West Coast | | | | PAR | | |
| Subcommittee Chairman: Dennis Gerlach (602/236-5483) | | | | ON FILE | | |
| IEEE | ANSI | WG/TF | | TRANS | | PES |
| <u>NO.</u> | <u>NO.</u> | <u>CHAIRMAN</u> | <u>IDENTIFICATION</u> | <u>COMM.</u> | <u>AS OF/STATUS</u> | <u>COORD.</u> |
| P513 | PC57.114 | S. Oklu | Seismic Guide for Power Transformers and Reactors | Yes (7/73) | 2/16/89 - Discussion re 3 negative comments on D/17 from main committee. | NPE Sub |
| P842 | PC57.120 | R. Jacobsen | Loss Evaluation Guide for Power Transformers and Reactors | Yes (5/80) | 8/28/89 - D/15 to be prepared to include editorial changes of TC ballot. Then ready for Std. Bd. | Sub RM PG |
| | PC57.93 | D. Johnson J. Gillies, VC | Guide for Installation of Liquid Immersed Power Transformers (Including C57.12.11 and C57.12.12 Consolidation) | Yes (6/82) | 2/16/89 - D/2 work in progress | None |
| | PC57.128 | H. Johnson | Fire Protection of Outdoor Liquid Immersed Power Transformers | Yes (6/89) | 6/1/89 - PAR submittal approved by Std. Bd. | NPE Sub PSR |

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Subcommittee: Dielectric Tests

Subcommittee Chairman: Robert E. Lee (215/398-5150)

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS COMM. | AS OF/STATUS | PES COORD. |
|--------------|-------------|--------------------|---|----------------------------------|---|---------------|
| | | H. R. Moore | WG on Revision of Dielectric Tests | | | |
| PC57.21a | | W. N. Kennedy | TF on Revision of Dielectric Tests of Shunt Reactors | Yes (2/86) | 4/11/89 - Discussion on DB ballot. | None |
| PC57.12.00j | | R. A. Veitch | New section 6.8 - Minimum External Clearances Between Transformer Line Parts of Different Phases of same voltage. | Yes (2/86) | 6/26/89 - Complete - Hold for C57.12.00 submittal | None |
| PC57.98 | | R. E. Minkwitz | TF Revision for Guide for Transformer Impulse Tests | Yes (2/86) | 4/11/89 First Draft being prepared | None |
| PC57.12.90 | | | Rev. Par 10.7.2 Enhancement Voltage Time | No | 4/11/89 Concept under advisement | |
| | | J. Rossetti | WG for Revision of Dielectric Testing of Distribution Transformers | | | |
| PC 57.12.90c | | W. R. Henning | TF on Routine Impulse Test for Distribution Transformers | Yes (9/87) | 4/11/89 D6 Subcommittee ballot review | RM PSC |
| | | R. E. Lee | TF on Low Side Surge Requirements for Distribution Transformers | None Required | 4/11/89 Seminar Preparation | |
| | | G. H. Vaillancourt | WG on Partial Discharge Tests for Transformers | | | |
| | | W. J. Carter | TF for Measurement of Apparent Charge | None Required | 4/11/89 Considering changes to C57.113 Section 5 | |
| PC57.127 | | E. Howells | TF on Guide for the Detection of Acoustic Emissions From Partial Discharges in Oil-Immersed Power Transformers | Yes (3/88) | 10/10/89 Ballot to TC | T & D PG |

ASC-D

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Subcommittee: Dry Type Transformers
 Subcommittee Chairman: Roy E. Uptegraff, Jr. (412/887-7700)

PAR
ON FILE

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | TRANS COMM. | AS OF/STATUS | PES COORD. |
|-------------|-------------|-------------------|---|------------------|--|---------------|
| | C57.21 | R. Dudley | Loading Dry Type Reactors (contribution) | None Required | 4/11/89 Work essentially complete | None |
| P259 | None | A. M. Iverson | Standard Test Procedure for Evaluation of Systems of Insulation for Special- ty Transformers | No | 4/11/89 - D/4 Discussion | ? |
| | PC57.96 | W. H. Mutschler | Guide for Loading Dry Type Distribution and Power Transformers | No | 4/11/89 WG looking into temp- erature related parameters. | |
| | PC57.124 | A. D. Kline | Recommended Practice for Measuring Partial Discharge and Measurement of Apparent Charge in Dry-Type Transformers | Yes (1/86) | 4/11/89 - Discussion re D5 | None |
| | PC57.12.60 | R. L. Provost | Standard Test Procedure for Thermal Evaluation of Insulation Systems for Solid Cast and Resin Encapsulated Power and Distribution Transformers | Yes (11/85) | 8/17/89 "Trial Use" not to be in title, per Std. Bd. | Un- clear |
| | | R. L. Provost | Thermal Evaluation of Insulation Systems of Dry- Type Transformers above 600V | No | 4/11/89 Title and Scope being defined. | |
| P745 | PC57.12.58 | A. D. Kline | Guide for Conducting Transient Voltage Analysis of a Dry-Type Transformer Coil | Yes (6/78) | 4/12/89 TC voted to reapprove and resubmit to Std. Bd. 10/23/89 - Materials not yet received for submission | |
| | PC57.16 | R. Dudley | Working: Requirements for Current Limiting Reactors | No | 4/11/89 - Revision starting | |
| | C57.12.91 | E. Koenig | Test Code for Dry-Type Distribution and Power Transformers | Yes (6/89) | 4/9/89 Initial meeting of Task Forces | SPD RM |

Subcommittee: Instrument Transformers
 Subcommittee Chairman: John N. Davis (404/447-7386)

PAR
ON FILE

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | TRANS COMM. | AS OF/STATUS | PES COORD. |
|-------------|-------------|----------------------------------|---|----------------|--|--------------------|
| P546 | PC57.13 | | Standard Requirement for Instrument Transformers | Yes (5/80) | 4/11/89 D6 review, esp. Tables 2 & 3. | PSIM PSR SPD |
| P670 | C37.077 | J. G. Reckleff (Joint w/Swgr) | Requirement for Current Transformers for use with AC-High-Voltage Circuit Breakers | No | 4/11/89 - No report | ? |
| P832 | PC57.13.4 | A. J. Jonnatti | Detection of Partial Discharge and Measurement of Apparent Charge Within Instrument Transformers | Yes (10/79) | 4/11/89 - No report | T & D |

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Subcommittee: HVDC Converter Transformers and Smoothing Reactors
 Subcommittee Chairman: William N. Kennedy (413/494-2322)

PAR
 ON FILE

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | TRANS COMM. | AS OF/STATUS | PES COORD. RM T & D |
|-------------|-------------|-------------------|--|----------------|-----------------------|------------------------------|
| | PC57.129 | W. Kennedy | General Requirements and Test Code for Oil-Immersed HVDC Converter Transformers and Smoothing Reactors for DC Power Transmission | Yes (6/89) | 4/10/89 D1 Discussion | |

Subcommittee: Insulating Fluids
 Subcommittee Chairman: Henry A. Pearce (412/983-4335)

PAR
 ON FILE

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | TRANS COMM. | AS OF/STATUS | PES COORD. |
|-------------|-------------|-------------------|---|----------------|---|---------------|
| | PC57.106 | F. W. Heinrichs | Guides for Acceptance and Maintenance of Insulating Oil in Equipment | Yes (4/86) | 4/11/89 D2 review | None |
| | PC57.104 | H. A. Pearce | Guide for the Detection and Determination of Generated Gases in Oil-Immersed Transformers and Their Relation to the Serviceability of the Equipment | Yes (12/81) | 8/7/89 D8 to TC ballot | PSR T & D |
| | PC57.130 | J. P. Kinney | Guide for the Detection and Identification of Gases in Oil-Immersed Transformers During Factory Tests | Yes (6/89) | 6/1/89 - PAR Approval with Title change | None |

Subcommittee: Insulation Life
 Subcommittee Chairman: David H. Douglas (216/447-3370)

PAR
 ON FILE

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | TRANS COMM. | AS OF/STATUS | PES COORD. |
|-------------|-------------|-------------------|--|----------------|--|---------------------------|
| | PC57.91 | W. E. Wrenn | Guide for Loading Mineral Oil-Immersed Transformers | Yes (3/85) | 4/11/89 - Inputs of 4 TF being reviewed. | Sub T & D PSE |
| | PC57.100 | L. A. Loudermilk | Standard Test Procedure for Thermal Evaluation of Oil-Immersed Distribution and Power Transformers | Yes (10/88) | 4/11/89 - Discussion re D3 of Appendix. | NPE RM T & D SPD |
| P638 | PC57.119 | R. L. Grubb | Recommended Procedures for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Rating | Yes (9/80) | 4/11/89 Discussion re ballot. | SWGR SUB PSR |

ASC-D

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Subcommittee: Performance Characteristics

Subcommittee Chairman: John W. Matthews (301/281-3775)

| | | | | | | |
|--|------------|-----------------|-----------------------|--------------|--------------|---------------------|
| IEEE | ANSI | WG/TF | | PAR | ON FILE | |
| <u>NO.</u> | <u>NO.</u> | <u>CHAIRMAN</u> | <u>IDENTIFICATION</u> | <u>TRANS</u> | <u>COMM.</u> | <u>AS OF/STATUS</u> |
| | | | | | | <u>PES</u> |
| Consolidated Changes to C57.12.00-1987 | | | | | | <u>COORD.</u> |

| | | | | | | | |
|--------------|-------------|----------------|--|----------------|---------|--|---------------|
| P462C (1) | PC57.12.00 | W. R. Henning | Revision of Sec. 5.9 Reference Temp. for No-Load Loss | Yes (6/79) | 4/11/89 | Ready for subcommittee ballot | PSIM T & D |
| P462C (2) | PC57.12.00 | W. R. Henning | Addition to Sec. 9.3.1 Accuracy Requirements for Measured Losses | Yes (6/79) | 4/11/89 | Ready for Subcommittee Ballot | PSIM T & D |
| | PC57.12.00h | R. H. Frazer | TF - change Sec. 5.12 "Nameplate Voltage Note changes for LTC" | Yes (9/86) | 4/11/89 | Proposal to be prepared for subcommittee | None |
| | PC57.12.00i | J. W. Matthews | TF - Nameplate Info "Directed Flow" | Yes (12/86) | 6/2/89 | - D1 ballot | None |
| | PC57.12.00k | C. J. McMillan | TF - Change Table 16 Routine Resistance Test | No | 4/6/89 | - Awaiting ballot returns of TC | |

Consolidated changes to C57.12.90-1987

| | | | | | | | |
|------------|------------|----------------------------|--|---------------|---------|--|-----------------------------|
| P262 E3 | PC57.12.90 | W. R. Henning | General Revision of Sec. 8 No-Load Losses and Excitation Current | Yes (6/79) | 4/11/89 | Ready for subcommittee ballot | PSIM T & D |
| P262E | PC57.12.90 | W. R. Henning | General Revision of Sec. 9 Impedance and Load Losses | Yes (6/79) | 4/11/89 | Ready for subcommittee ballot | PSIM T & D |
| | | | Sec. 7.3, Figures 9 & 10 reversed | | 4/11/89 | Hold for C57.12.90 submittal | |
| P1098 | PC57.123 | W. R. Henning R. Girgis | Guide for Transformer loss Measurement | Yes (3/85) | 4/11/89 | Scope discussion Looking for TF members | PSIM |
| P638 | None | L. R. Stensland | Qualification of Class 1E Transformers for Nuclear Power Generating Stations | Yes | 4/10/89 | D/17 to be issued based on D16 ballot of main committee. | NPE SUB |
| | PC57.18.10 | C. G. Pounds | Practices and Requirements for Semiconductor Power Rectifier Transformers | Yes (6/81) | 4/11/89 | D6 reworked by working group | None |
| | PC57.21 | J. W. McGill | Requirements, Terminology, and Test Code for Shunt Reactors over 500 KVA | Yes (6/88) | 8/7/89 | D/9 to TC for ballot | RM T & D PSR |
| | PC57.125 | D. J. Cash W. B. Binder | Guide for Failure Investi- gation, Documentation and Analysis for Power Trans- formers and Shunt Reactors | Yes (2/87) | 4/11/89 | D8 being prepared. | T & D PGS PSE SWGR |
| | PC57.131 | T. P. Traub | Standard Requirements for Load Tap Changers | Yes (8/89) | 9/89 | D2 Issued based on IEC 214 | RM T & D |

ASC-D

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STATUS OF STANDARDS SUBMITTALS - AS OF OCTOBER 24, 1989

| <u>SubCom</u> | <u>Number</u> | <u>Title</u> | <u>Std Bd</u> <u>Approved</u> | <u>Published</u> <u>IEEE</u> | <u>C57</u> <u>Approve</u> | <u>ANSI</u> <u>Approve</u> | <u>Published</u> <u>ANSI/IEEE</u> |
|-----------------|---------------|---|----------------------------------|---------------------------------|------------------------------|-------------------------------|--------------------------------------|
| Insul Fluids | PC 57.111 | Guide for Acceptance of Silicone Insulating Fluid and its Maintenance in Transformers | 2/2/89 | 9/11/89 | pending | | |
| Dry Type | PC 57.12.01 | General Requirements for Dry-Type Distribution and Power Transformers | 2/2/89 | sched 11/89 | pending | | |
| Dry Type | PC 57.12.59 | Dry-Type Transformer Through Fault Current Duration Guide | 6/1/89 | sched 11/89 | pending | | |
| Insul Fluids | PC 57.121 | Guide for Acceptance and Maintenance of Less Flammable Hydrocarbon Fluid in Transformers | 12/87 w/condx | sched early 90 | pending | | |
| Perf. Char. | PC 57.116 | Guide for Transformers Directly Connected to Generators | 1/30/89 | 9/29/89 | pending | | |
| Dry Type | PC 57.96 | Guide for Loading Dry Type Distribution and Power Transformers | 3/6/89 | No | Yes | 4/26/89 | 6/29/89 |
| Bushing | PC 57.19.101 | Guide for Loading Apparatus Bushings | 10/20/89 | 7/17/89 | pending | | |

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IEEE/PES TRANSFORMERS COMMITTEE Chairman's Report

October 30 - November 01, 1989
Charlotte, North Carolina

Report from the Technical Council (TC):

The PES Technical Council met at the Summer Power Meeting in Long Beach, California on July 11, 1989. Your chairman attended this meeting as the representative of the Transformers Committee. Although these meetings tend to be very long and cover a wide variety of topics, I will only highlight those subjects of interest to the operation of the Transformers Committee.

The TC meeting begins with a report from the Chairman, Walt Elmore, on the highlights of the Executive Board Meeting held at the T & D Conference in New Orleans. The following points should be noted:

(1) PES President, Behnke, has written to all the EEI Electric Utility Officers encouraging their increased participation in the activities of the IEEE Power Engineering Society. A number of our utility members have been restricted in their participation in the Transformers Committee due to severe travel restrictions. We hope this urging by President Behnke will bear fruit.

(2) We should continue to strive for "practical papers". Each committee should encourage their membership, not only to write more practical papers, but to be willing to accept them in their grading process. Although IEEE papers are intended to be at the cutting edge of technology, there is also allowance for accommodating papers which have a more meaningful and immediate use to the membership. To have only esoteric papers that are understood by, and which cause an impact on very few readers, may be a waste of time and paper. We need to accept a full spectrum of papers. I personally believe this is excellent advice.

General Meeting Scheduling:

As I indicated in my last report to the Transformers Committee, the TC has been actively pursuing the goal of establishing a "Master Plan" for all paper sessions and panel sessions at the General Meetings. Over the past year, the members of TC have been reviewing proposed plans and providing their input. At the last TC meeting, the "Master Plan" was accepted unanimously. The following is a summary of the goals of the master plan:

- 1) Provide the capability to organize the activities of individual committees to minimize internal conflict.
- 2) Provide an even flow of technical programs over the entire duration of the meeting.
- 3) Provide the capability to minimize conflict between technical committees on like subject areas.
- 4) Provide enough flexibility in the planning process to permit the job to be done right and to adapt to changes over time.

In the master plan, no sessions are scheduled for Friday. In the past, Friday sessions have been extremely unpopular and most technical committees objected to having their sessions scheduled for this day. The Transformers

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IEEE/PES TRANSFORMERS COMMITTEE Chairman's Report

Committee has one session only in the master plan on Wednesday afternoon. If a second session is required, I have requested that it be scheduled on Wednesday morning. The fact that we have only one session in the master plan does not mean that additional sessions will not be provided, if there are sufficient approved papers.

Another major change in the master plan is the number of papers in each session which will be restricted to a minimum of four and a maximum of five. In order to eliminate Friday sessions, it has been necessary to obtain better space utilization, thus the requirement for a minimum number of papers per session. If the Transformers Committee had 7 papers for presentation, we would have one 5 paper session on Wednesday afternoon and the 2 additional papers would be presented in a joint session with another technical committee.

These are rather extensive changes, but the situation will be closely monitored and modified if required.

Changes to the Publication Guide and Authors' Declaration of Intent for Conference Record Papers

For the past year the TC has been considering the re-introduction of "Conference Papers" for special Technical Conferences such as the T & D Conference. We have also considered and approved the presentation of Transactions Papers at times and locations other than the Winter & Summer General Meeting. The "Publication Guide" and "Declaration of Intent" forms have been modified to reflect these changes. The proposed revisions were approved at the TC meeting.

With respect to Conference Papers, the following rules will appear in the revised Publication Guide:

- 1) All technical papers for the conference are to be submitted, reviewed and processed in the same manner as for the General Meeting and as required by this guide.
- 2) Special Technical Conferences may accept conference record papers. Conference record papers are papers that bring a practical usable message to the industry even though it is not necessarily unique or unprecedented and has a theme generally in keeping with the goals of the conference.
- 3) All technical papers will be classified either as Transaction or Conference Record by the author on the declaration of intent form. A paper will be reviewed according to its submittal and cannot change status. Upgrading, downgrading, and resubmittal will not be allowed.
- 4) Conference record papers will not require a one page summary but are limited to seven pages. There will not be written discussions and closures for conference record papers.
- 5) Conference record papers will be published in the conference proceedings and will not be eligible for publication in the Transactions of the PES.

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IEEE/PES TRANSFORMERS COMMITTEE
Chairman's Report

6) The Transaction papers will follow the same procedures as for a General Meeting and preprints will be available so that there can be discussions at the meeting.

7) The publication of the conference proceedings is to be handled and financed by the conference committee. The conference proceedings shall include both Conference Record papers and preprints of the Transaction papers presented.

Publications Guide Modifications for Review of Visuals

The TC has passed a major change in the rules governing visuals for paper presentations and panel sessions. It was hoped that these new rules could have been implemented in time for the 1990 Winter Power Meeting. The new rules will be printed as an addendum to the Publication Guide so that any needed changes based on the use of the new rules can be made.

The two basic changes will require a review and approval of all visuals and will allow the use of overhead projectors. If visuals are not submitted and approved, the paper will be rejected.

Panel Sessions

Recently panel sessions on current topics have become popular at the summer and winter General Meetings. Since the topics are timely and presentations are generally less technical compared to a transactions paper, panel sessions have attracted good attendance.

However, these sessions are competing among themselves and take away audience from paper sessions. Another shortcoming is that the presentations and discussions at the panel sessions are normally lost unless someone records the session and writes a paper.

Considering these problems, it appears there is a need to control the number and quality of panel sessions. The following recommendations are being considered.

1) Choose topics which are general and controversial. Deliberately have panelists with differing points of view. Panel session should not be a way to beat the paper review system or the tutorial approval process.

2) Send the topic and scope and expected attendance to the Technical Sessions Improvement Committee by May 1 for Winter Meeting and December 1 for Summer Meeting. The Committee will review and approve the proposal at Winter or Summer Meeting for the following meeting. The Technical Committee can proceed with the planning of the session.

3) Decide if the panel sessions should be recorded (video, audio, or notes) for later publication of the material. Any resultant paper must be reviewed by the Committee before acceptance as a transaction paper.

4) Guidelines for organizing the panel will be prepared--duties of chairman, panelists, and audience (discussions) will be identified. Ways to control the speaker's time and allow time for audience participation will be in the guidelines.

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IEEE/PES TRANSFORMERS COMMITTEE Chairman's Report

5) It is recommended that authors for all panel sessions be required to prepare a written paper covering his presentation and bring sufficient copies, as dictated by the Session Chairman, for pass-out at the panel session. The paper need not follow all the rules and procedures described in the Publication Guide although the visuals (slides or viewgraphs) should follow PES guidelines.

Power Engineering Education Committee

The Committee, with the strong encouragement of the PES President and Executive Board is currently endeavoring to extend its activities into areas that will enable it to deal more effectively with the current unsatisfactory situations in electric power engineering education, and to bring these problems more effectively to the technical community's attention. To this end, a liaison has been established with EEI, and a Publicity Subcommittee set up to coordinate and sponsor activities that will focus attention on the problems and assist in their solution.

Scope Changes in the Transformers Committee

As previously reported, I had sent the proposed new scopes for the Transformers Committee and the HVDC Converter Transformer and Smoothing Reactor Subcommittee to the Technical Council's Organization and Procedures Committee for review. I attended the O&P Committee Meeting held on July 11, to expedite the approval of the new scopes. There was no disagreement as to the technical content of the scopes as presented, however, it was felt that the wording could be simplified and condensed.

I revised the scopes and resubmitted them to the O&P Committee on July 14, 1989. They were subsequently sent to all members of the O & P Committee for balloting. I discussed the status of this ballot with Jim Edmonds, the O&P Committee Chairman on October 16/89. At this time only 50% of the ballots have been returned even though he has followed up with all delinquent committee members. All returned ballots are favorable.

Once the O&P Committee has approved the new scopes, they must then be sent to the Technical Council for a final ballot. I asked Jim to do whatever he could to expedite this matter.

Transformers Committee Operating Manual

The new operating manual is on disk and waiting to be printed. However, this cannot be done until the new scopes have been approved. I was hoping to have the new manual printed for the fall Transformers Committee meeting, unfortunately it will not be ready until the spring 1990 meeting.

R. A. Veitch
October 23, 1989

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1 OF 1

INSULATING FLUIDS SUBCOMMITTEE

1. The major work of the Insulating Fluids Subcommittee is the review of ballots on Draft 8 of the Gas Guide - C57.104.
2. Some work will be done on a revision of the Oil Guide - C57.106.
3. Work is beginning on the Guide for Gas Analysis During Factory Test - C57.130.
4. The Silicoine Guide - C57.111 - has been issued.
5. The HTH Guide - C57.121 - is going to printing.

Henry Pearce
Chairman

10/30/89

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Administrative Subcommittee Meeting - 10/30/89

Performance Characteristics Subcommittee Activities

Working Groups - Transformers Directly Connected To Generators

C57.116-1989 "Guide for Transformers Directly Connected to Generators" has been published. This Working Group will be disbanded now that this project has been completed.

- LTC Performance Requirements

Project Number PC57.131 - Standard Requirements for Load Tap Changers was approved in August, 1989.

Interpretation Request - ANSI/IEEE C57.110-1986 "Recommended Practice for Establishing Transformer Capability When Supplying Non-sinudoidal Load Currents"

A request for interpretation of this Standard was received from Mr. Thomas Gruzs, Liebert Corporation. Mr. W. J. McNutt is drafting a response to this request, which will be presented at the PCS meeting tomorrow. With concurrence of the Subcommittee, the response will be sent to Ms. Sue Vogel for transmittal to Mr. Gruzs.

Projects - ANSI/IEEE C57.12.00-1987

A letter was received from Mr. Roy Uptegraff, Chairman of the Dry Type Transformers Subcommittee, regarding the need to review Section 4.1.6 - Operation Above Rated Voltage or Below Rated Frequency. This item will be brought up before the PCS for consideration during the next revision of this Standard.


PCS Chairman

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DIELECTRIC TESTS SUBCOMMITTEE ACTIVITIES ADMINISTRATIVE SUBCOMMITTEE - 10/30/89

1. Membership - 56
2. Standards Activities
 - a. Bill Kennedy - PC57.21/D8 - Requirements, Terminology and Test Code for Shunt Reactors over 500 kVA (Sections 6, 9, and 10).

Balloted at the Committee level by Jack McGill.
 - b. Bill Henning - PC57.12.90c/D6 - Routine Impulse Test for Distribution Transformers.

Committee level ballot due to Bill NLT 12/4/89.
 - c. Ed Howells - PC57.127/D2 - Trial Use Guide for the Detection of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers.

Committee level ballot conducted during October 1989.
4. IEEE High Voltage Testing Technique Subcommittee Meeting.

This Subcommittee is revising ANSI/IEEE STD #4-1978-IEEE Standard Techniques for High Voltage Testing. By letter dated 10/17/88 liaison was requested. Russ Minkwitz attended the first meeting in Lenox, MA on 11/15-16/89. The Transformers Committee should have representation.
5. Mr. Yasin I. Musa of American Electric Power Service Corporation informed me that he replaces Ed Yasuda as liaison from the SPD Committee.
6. Harold Moore, Chairman of the Working Group on Revision of Dielectric Tests has arranged the Seminar - "Experience with Digital Recording During Production Impulse Tests". It is scheduled for Tuesday afternoon at 3:10 PM.
7. Is there a mechanism to reimburse chairman, who have retired from industry, for their mailing and copying costs associated with their continuing chairmanships?

Robert E. Lee

Robert E. Lee
October 27, 1989

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1 OF 3

REPORT ON TECHNICAL PAPERS ACTIVITIES IEEE TRANSFORMERS COMMITTEE SUMMER 1989

The IEEE Transformers Committee sponsored one session at the IEEE Summer Power Meeting in Long Beach, California. This session was held on Tuesday, July 11, 1989 at 9:00 a.m. The session consisted of five technical paper presentations. Two papers dealt with the subject of gas analysis for power transformers, one paper dealt with the use of maximum likelihood estimation theory, one paper discussed distribution transformer bar coding, and one paper discussed the development of epoxies for outdoor apparatus of distribution systems. There was a total of twelve papers submitted for consideration at this meeting. Of those twelve papers, five were accepted, and seven were rejected.

The Transformers session was not well attended at the Summer Power Meeting. Attendance ranged from twenty down to twelve. It is obvious that the Transmission & Distribution Conference adversely impacted the quantity and quality of papers available for this Summer Power Meeting. It is suggested that working group and subcommittee chairmen review activities within their given areas to determine if suitable papers could be developed. We have not had many committee report type papers in recent years. It is suggested that this would be a good mechanism for informing others of the activities of the committee and providing practical comprehensive papers which would be of benefit to the profession. A word of thanks to those who reviewed papers for this meeting is in order as I feel that our reviewers did an excellent job in discharging this responsibility.

On July 19, 1989, I attended the Publications Committee meeting of the PES at Long Beach, California. It was reported that 225 papers had been accepted for the Summer Power Meeting. The annual page budget for the upcoming year will be 4000 pages. At the present time there is a delay of between six months and one year from the actual presentation of papers to publication in the Transactions. The Transformers Committee has been allocated six papers for the 1990 Summer Power Meeting. It was noted that the acceptance of 240 papers for the Winter Power Meeting is expected.

At the Publications Committee meeting there was discussion of paper review. Some concern has been raised regarding the ability of various committees to provide good knowledgeable reviews of certain topics. It was noted that many authors do not necessarily forward their papers to the most appropriate committee, and there are many papers which fall within the scope of more than one committee. It was suggested that consideration be given to joint review of papers by multiple committees in such circumstances. This does place additional burden on each of the given technical paper coordinators for the various committees as it will be their decision whether or not to seek review by a second committee. This could lengthen the review process; however, the prospect for improved reviews would seem to justify this difficulty. It was also noted that the Industrial Applications Society could be an appropriate review location for certain papers which may be submitted to the Transformers Committee.

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At the committee meeting the proposed revisions to the Publications Guide were discussed. These revisions were aimed at allowing conference record papers. At the meeting, it was decided to recommend that the conference records which will be printed for these papers should also include the transactions paper presented at each conference. This recommendation must go to the technical council; however, if adopted, it would result in a complete record of all of the papers presented at the conferences. Those conferences which would be affected by this would include the T&D, PICA Meeting and the Joint Power Generation Conference. This proposal would not affect the WPM or the SPM.

The Publications Committee discussed a number of long range items, a condensation of which follows:

1. Our policy of presentation before publication was reaffirmed.
2. The encouragement of practical papers will continue.
3. The publication of all papers presented at conferences as part of a conference record was reaffirmed.
4. Foreign conferences, i.e., the China conference or the India conference, will require paper review. It is proposed that the paper review be handled similar to the other conferences being held in that the U.S. technical committees will review papers for these international conferences. We will use the same procedures currently underway, and paper review will be coordinated through Nancy Heitmann.
5. It will be highly recommended that panel session speakers be highly encouraged to provide a written paper covering their remarks. This will not have to be a complete paper, but may be in the form of an abstract or summary. There was considerable concern that this will cause us to lose desired panelist; therefore, this proposal will not be considered mandatory. The burden will be on the sponsoring committee to obtain such a paper from each of the panelists.
6. There is concern over a perceived lack of attendance and lack of discussion for paper presentations. It was noted that subcommittee chairman as well as technical paper coordinators should encourage discussion as much as possible. It was requested that the mailing of the preprints be done as early as possible to allow more time for mailing to knowledgeable individuals and to provide them sufficient time to prepare the desired discussion.
7. It was decided not to pursue the concept of interpreters at the sessions. We will recommend that we remain with our English only policy.
8. There was discussion of paper preprint sales as well as sales of paper discussions and closures. A number of mechanisms for enhancing sale of preprints were suggested including enhanced "Bingo Cards" as well as electronic bulletin boards.

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9. Sentiment was expressed to develop a system to allow purchase of individual discussions and closures to compliment previous purchase of the preprinted paper. However, the mechanism of such a proposal would be extremely complicated. This item was tabled for additional consideration.
10. It was agreed that the author does have the right to specify the order of printing of discussions so that he can arrange his paper closure to match their order. However, the burden of making such a request is on the author.

This concluded the discussions at the Technical Council Publications Committee meeting at the SPM.

WINTER POWER MEETING
Technical Session
Paper Summary

The Transformers Committee has recently reviewed fourteen technical papers which were submitted for the 1990 Winter Power Meeting. In addition, three additional papers, on related topics, by the same authors were carried over till the next meeting due to the difficulty in getting reviews of all three related papers by given reviewers within the allocated time frame. Therefore, a total of seventeen papers were submitted.

Of these papers, 3 were accepted as submitted; 2 were accepted with suggested changes; 2 were accepted with mandatory changes (rewrite with better English usage); 3 were rejected for revision (RJR); and 4 were rejected outright (RJO). Therefore, we have five papers which will be scheduled for the 1990 Winter Power Meeting with the possibility of two additional papers. Under the new rules for sessions, this will probably result in one session.



John J. Bergeron
Technical Papers Coordinator

10/26/89



IEEE

**POWER ENGINEERING SOCIETY
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PLEASE REPLY TO:

October 27, 1989

**IEEE Transformer Committee and
Administrative Subcommittee**

**Subject: Awards Subcommittee Activities
May 1989 - October 1989**

The following activities have been acted upon:

Certificate of Appreciation

None to be distributed to the November meeting;
Subcommittee Chairmen are asked to submit candidates for
the spring of 1990 meeting.

PES Prize Paper Award Nomination

The paper "A Refined Mathematical Model for Prediction
of Bubble Evolution in Transformers" by Fessler, et al
has been submitted by the Transformer Committee.

Technical Committee Prize Paper Award and Technical
Committee Working Group Recognition Award

Reviews are being made for submission to PES.

Outstanding Power Engineering Educator Award

Data has been obtained for submission of Mel Manning for
this award.

Other Activities

Information was prepared related to the awards committee
activities for insertion in the Operating Manual. This
was submitted to Leo Savio.

D. A. Yannucci, Chairman
Awards Subcommittee

ajm:1793R

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IEEE TRANSFORMERS COMMITTEE

AUDIBLE SOUND AND VIBRATION SUBCOMMITTEE

CHARLOTTE, NORTH CAROLINA

OCTOBER 31, 1990

Minutes

Chairman Allan Teplitzky opened the meeting at 10:05 a.m. with 12 members and 17 guests present.

| | | |
|----------|---------------|-----------------|
| Members: | John Ebert | Bill McNutt |
| | Ramsis Girgis | Louis Nicholas |
| | Robert Grubb | Linden Pierce |
| | Roger Hayes | Jim Pollitt |
| | John Lackey | Lennart Swenson |
| | Jack McGill | Allan Teplitzky |

| | | |
|---------|-----------------|-------------------|
| Guests: | B.F. Allen | Richard Marusinec |
| | Barry Beaster | Klaus Papp |
| | Tom Bowers | Davis Parr |
| | Orean Chew | Van Quan Pham |
| | Max Cumbre | Stephen Smith |
| | Alfonso Delgado | James Tingen |
| | Jerry Grimes | George Tolbert |
| | John Grouse | David Ward |
| | William Kruesi | |

Minutes of the April 11, 1989, meeting in Chicago were approved.

Results of Draft 8 and Draft 9 of the proposed revision of the audible sound measurement portion of C57.12.90 were discussed. There were negative ballots which required resolution on both drafts. Draft 9 was an attempt to resolve Draft 8 comments in time for the Charlotte meeting but another negative vote resulted. All negative ballots were discussed at the meeting and apparently resolved to the satisfaction of those present. Three primary areas of concern were:

- 1) The need to designate one preferred measurement method. The revision had three measurement methods with no order of precedence. The A-weighted sound pressure level will apply if the buyer does not specify method or methods to use.
- 2) Some manufacturers may be unable to provide a 3 m (10 ft.) distance from the microphone to the nearest reflecting surface. The shorter distance will have to be permitted in those circumstances.
- 3) Additional clarification of the measurement of ambient sound level is needed.

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2

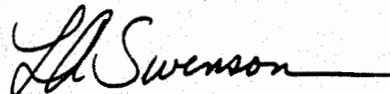
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Draft 10 will be distributed for ballot prior to the Denver meeting in March, 1990.

The transformer siting guide project has not been started. A task force or working group will be established. The working group will first draft a scope for approval by the subcommittee. Reports prepared by and for the Empire State Electric Energy Research Corporation will form a valuable foundation for this project.

The meeting was adjourned at 12:25 p.m.

Respectfully submitted,



Lennart Swenson
Secretary, Audible Sound and
Vibrations Subcommittee

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BUSHING SUBCOMMITTEE

Report to Transformers Committee

November 1, 1989

The Bushing Subcommittee met on Tuesday, October 31, 1989 with eight members and six guests present. After introductions, approval of the Chicago meeting's minutes and announcements, the meeting heard the reports of the Working Groups and Task Force.

Fred Elliott, Chairman of the Working Group on the Bushing Application Guide, reported that the working group met on Tuesday morning with seven members and six guests present. It was first reported that C57.19.101, Bushing Loading Guide, had been published in July as a trial use guide.

The working group then reviewed the results and the comments of the working group ballot on PC57.19.100, Guide for Application of Power Apparatus Bushings. Ten ballots were sent out and returned. Of these, four were affirmative, five were affirmative with comment and one was negative. Most of the comments were addressed during the meeting and Fred will attempt to reballot the working group before the next meeting.

The Working Group on Bushings for DC Applications met on Monday (10/30) with seven members and seven guests present. Acting Chairman Wagenaar reported that a PAR had been requested and that the Substation Committee had been contacted asking their opinion about covering wall and roof bushings in the proposed standard. The working group then reviewed the present draft. Several new definitions were added and several changes were made to the existing definitions, usual service conditions and test sections. Calculations for ac and dc test voltages were presented by Devki Sharma but time did not permit discussion of these.

Lloyd Miller, Chairman of the Task Force on bushings for Distribution Transformers, was not at the meeting but has reported that there has been no interest in standardizing on these bushings. The original purpose of the task force was to determine if there was a need for a standard covering these bushings. Since the task force has, in effect, determined that there is not sufficient interest in developing a standard to cover these bushings at this time, the subcommittee voted to disband the task force.

The subcommittee reviewed the results and the comments of the latest subcommittee ballots on PC57.19.00/d9 (ANSI/IEEE 21) and Tables 9 (partial discharge limits) and 10 (power factor and test capacitance limits) of PC57.19.01/d2 (ANSI/IEEE 24). The results of the ballots are tabulated below:

| | <u>PC57.19.00</u> | <u>Table 9</u> | <u>Table 10</u> |
|-----------------------|-------------------|----------------|-----------------|
| Ballots Sent Out | 26 | 26 | 26 |
| Ballots Returned | 20 | 21 | 21 |
| Affirmative | 8 | 20 | 19 |
| Affirmative w/comment | 7 | 1 | 0 |
| Negative | 5 | 0 | 2 |

All of the comments were resolved and subcommittee members agreed that the three items would be sent to Main Committee for ballot.

An item of old business involves the accidental flashover of bushings due to misoperation of the deluge system. As reported at the Long Beach meeting a year ago, eight such cases were reported to Doble over the past 15 years. The subcommittee voted to remove this as an agenda item because this was felt to be an insufficient number on which to make valid conclusions or to merit further investigation.

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Under new business, the subcommittee agreed to consider three new items: First, one of the comments of the ballot for PC57.19.00 suggested that susceptibility of gasketed joints in porcelains to ultraviolet light and electric fields be considered. This was referred to the Working Group on the Bushing Application Guide for consideration in the new guide. Second, the need for qualifying epoxy weather casings for bushings was discussed. Some members felt that this is a matter of qualifying materials and we have no business in this area. Others felt that we can specify certain tests to qualify bushings using epoxy weather casings. Members were asked to review this topic before the next meeting.

Third, the need for specifying a minimum moment on the top terminals of bushings rated 138kV and above was discussed. This need arises from the fact that many utilities are now using a device at the top of the bushing to quickly isolate the bushing from the line in order to make maintenance tests. This arrangement places a moment on the bushing's top terminal due to the line pull and some top terminals have bent. This requirement is not presently covered in the standards and will be considered at future meetings.

L.B. Wagenaar

11/03/89

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1 OF 2

Minutes of the October 30, 1989 Meeting of the
HVDC Converter Transformer and Smoothing Reactor Subcommittee
Charlotte, N.C.

The meeting was called to order at 8:00 AM with six members and six guests present. A new member was added, Mr. Van Quan Pham from ABB Canada. After the usual introductions and discussions of the minutes of the previous meeting in Chicago, we briefly discussed the latest meeting of the CIGRE Joint Working Group 12/14-10 on Oct. 1 in Rio de Janeiro. As discussed in the minutes of the April 10th meeting, there are four basic activities presently being conducted by the CIGRE working group. Status of these activities is given below:

- o Task Force on Transformer Reliability - This task force had its first meeting on Oct. 29. Mr. Gil Desilets from Hydro Quebec is the chairman of this all-utility task force the scope of which is to investigate problems associated with failures of converter transformers in service.
- o Converter Transformer Specifications - Mr. T. H. Harrison has prepared an extensive list of specifications which continues to receive editorial changes from other members.
- o Dielectric Testing of Converter Transformers - The CIGRE working group discussed draft #3 of the paper comparing the operating and test stresses in converter equipment. This paper suggests that although present tests demonstrate adequate margin over test stresses for the operating stresses in the solid insulation, under certain extreme conditions the service stresses in the oil may not have the desired margin over the dc test stresses. As a result of suggestions from the members of the working group, draft #4 will include polarity reversal and switching surge stresses added to the examples presented in the paper.
- o Other items being examined in the CIGRE working group include harmonic currents, losses, acoustic noise, and unbalance and variations in transformer reactances. ABB presented some harmonic loss measurements which agreed quite well with the Manitoba Research paper published in 1987.

#2 of the Subcommittee's new document, "General requirements and Test Code for Oil-Immersed Converter Transformers and Smoothing Reactors for DC Power Transmission" was distributed and discussed at the meeting. It was first noted that dry-type smoothing reactors are being given more application in HVDC systems, and it was decided that they be included in the standard. Dry type

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reactors would be within the scope of the subcommittee, and a revised PAR will be prepared and submitted for approval.

There was some discussion regarding definitions for the windings in the converter transformer. It was agreed to use "ac-side" and "dc-side" for the windings connected to the ac system and valves, respectively, provided that these terms are in agreement with the IEEE dictionary. In addition, we discussed the terminology for the long-term dc test and agreed to use "dc applied voltage test" in the next draft.

The remainder of the meeting was spent discussing the dielectric tests in sections 6 and 7 of the current draft. Each member was requested to submit a revision of the wording of Section 6.11.2 of the draft, which discusses insulation levels for the dc-side windings of converter transformers and smoothing reactor windings. Two full-wave insulation levels will be called for; one across the winding and one applied to both ends connected together. It was agreed that there would also be two switching surge levels specified, although the switching surge across the winding would not be performed because it could result in severe overvoltages across the ac-side winding. There was some discussion regarding whether the switching surge tests are coordinated with the full wave levels similar to ac transformer standards; members are encouraged to review this topic before the next meeting in Denver as we could eliminate or simplify Table 1 in the standard depending on the results.

Discussions will continue at the next meeting on the dielectrics sections.

The meeting was adjourned at 9:45.

Respectfully Submitted,



William N. Kennedy
Chairman, HVDC Converter Transformers and Smoothing Reactors
Subcommittee

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ABB

**Westinghouse ABB
Power T&D Company**

651 Holiday Drive
Pittsburgh, Pennsylvania 15220

LIAISON REPORT
CIGRE SC-12 (TRANSFORMERS)

1.0 Introduction

CIGRE Study Committee 12 (Transformers) held its annual meeting in Rio de Janeiro, Brazil from Oct. 2- Oct. 6, 1989. Several working groups met prior to the main meeting, and a technical visit to the Itaipu power project was conducted on Oct. 7.

Approximately 50 transformer and utility representatives, primarily from Europe, participated in the general discussions. Subjects included "Thermal Aspects of Transformers" and "Problems Relating to Large Generator Transformers." In addition, a joint one-day colloquium was held jointly with Study Committee 15 (Insulating Materials) which covered chromatography, static electrification, and ageing of insulation.

2.0 Thermal Aspects of Transformers

a) Direct Measurement of Hot Spot Temperatures

The use of fiber optic devices is gaining considerable support in Europe from both the utilities and the manufacturers. There are currently two principal suppliers of the equipment: ASEA and Luxtron. These units measure the temperature at a discrete point at the tip of the probe. A new development using the "Ramon Effect" was also described which measures the temperature along the length of a fiber optic light pipe. One European manufacturer described winding and testing a coil in air using the device and reported that for a 1000 meter light pipe, resolution was ± 1 meter and $\pm 5^\circ$ up to 200° C.

The Swedish State Power Board specifies the use direct hot-spot devices in all transformers that they purchase, while in Australia it was reported that the customer feels that he can defer purchase of new transformers by up to one year by better measuring of the loading of the transformers using the thermometers.

One interesting application of fiber optic thermometers was described by Ed Norton of the United States. He described a PG&E 15/20/25 mVA transformer which failed in service and was rebuilt with 16 Luxtron probes. These devices will be used to monitor the unit in the field as well as during the heat run. PG&E intends to

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equip future repaired transformers with 1 probe at a location which will be determined by the results of the heat run tests on the present unit.

Although usually considered to be of primary benefit to the customer, one individual described an application of a fiber optic thermometer that was very helpful to the manufacturer. A transformer was built and tested which measured a hot spot temperature during heat run using conventional techniques of 82°C vs an allowable value of 80°C. (The IEC calculation procedure gave an expected hot-spot of 72.8°C.) The unit was untanked, a fiber optic probe inserted into one leg of the coil, and the transformer was retested. The probe measured a hot-spot of 74.3°C and the transformer was accepted by the customer.

b) Heat Run Test Procedure and Determination of Hot Spot Temperatures Under Overload Conditions

Most of the information provided in this area came from a survey of manufacturers in ten countries performed by CIGRE Working Group 12.09. The survey was divided into three basic areas: oil rise temperature measurements, winding rise temperature measurements, and demonstration of overload capacity. Conclusions of the discussion included:

(1) Several utilities are specifying overload heat runs for their transformers. The Swedish State Power Board, for example, requires them on all transmission tie transformers. On units equipped with direct hot-spot measuring devices a 1.4 p.u. heat run is applied for eight hours with gas-in-oil samples taken every half hour. (The test is stopped if 140°C is reached.) On units without fiber optic thermometers a 1.3 times normal current is applied for 20 hours. Ontario Hydro presented a fairly complex overload profile which is performed on the first unit of an order along with a standard heat run; all subsequent units are tested at 85% of the overload profile. In Finland transformers have been tested to 1.5 times rated until the hot spot (either calculated or from fiber optic thermometers) reaches 140°C, after which the load is reduced to 1.4 times rated and held for eight hours.

3.0 Problems Relating to Large Generator Transformers

a) Specific service conditions affecting design

Problems with low voltage bus ducts appear to occur in virtually all countries. The primary difficulty is the lack of coordination between the bus duct designer and

the transformer engineer in determining where the duct is isolated and the type and location of magnetic shields (nomag steel, flux shunts, aluminum shields, etc.) that are used to control the field. Examples described included a GSU in the United States where the junction box overheated because the bus ducts were improperly isolated, and a design in East Germany where aluminum pipes used for ventilation between the isolated phase bus ducts overheated. When magnetic shields were added to the aluminum pipes the flux pattern was changed and hot spots developed on the tank wall of the transformer.

b) Testing of Large Generator Transformers

The primary topic in this section concerned the possible accuracy of load loss measurements. Although Dr. Stein from West Germany stated that levels of 1% can be achieved, the general consensus was that 3% accuracy is typical for most manufacturers at present. Reference was made to the Loss Measurement Guide currently being developed by IEEE.

With respect to dielectric tests, there was generally agreement from the manufacturers that impulse tests on the low voltage windings should not be necessary when bus ducts are used between the generator and transformer. This would be an item for consideration in IEEE when the C57.12.00 specifications are reviewed.

4.0 Current Problems in Insulating Systems (Joint Meeting with Study Committee 15 - Insulating Materials)

a) Dissolved Gas Analysis (DGA) and High Performance Liquid Chromatography (HPLC)

Three keynote presentations were made in these areas. Unfortunately copies of the papers were not available in time for the meeting but they will be distributed later. The first two presentations discussed dissolved gas analysis and compared several different criteria including IEC, Laborlec, Rogers, Doerenburg, and Pugh ratios. The general conclusion was that the Laborlec and Pugh criteria appear to be more accurate for most of the cases examined, although none of the methods is completely accurate. Inconsistencies are most likely to occur under conditions normally found in incipient faults for units operating only a short time. Several expert systems are available for DGA, including ones by IREQ (Canada) and EDF (France).

An excellent keynote speech was presented on High Precision Liquid Chromatography (HPLC) which promises to be a classic reference when it is published. The

author, M. Carballeira from France, demonstrated that HPLC, particularly when used in conjunction with dissolved gas analysis, can be a valuable tool for estimating the maximum temperature reached by the solid insulation in the range of 80 to 200°C, and can estimate the volume of the damaged insulation as well as its remaining lifetime.

b) Static Electrification

Stan Lindgren from EPRI presented the keynote paper for this subject with a comprehensive review of the work that has been sponsored by EPRI since 1979. Other individuals described work that is being performed at in France and Austria.

It was generally accepted that measurements of leakage currents with the pumps running is related to the electrostatic charging tendency of the oil, but it is difficult to develop a pass/fail criterion using this technique.

c) Estimation of Remaining Life

The keynote speech for this topic was presented by Lars Petterson of ABB in Ludvika. He summarized work on degree of polymerization (dp) of paper which is related to mechanical degradation and related it loss of life. One very interesting example he presented showed how different profiles of dp in paper insulation can provide valuable data on the mechanism of breakdown - i.e., whether the failure was caused by poor oil affecting the surface of the paper or by overheating of the conductor which would affect the dp on the paper next to the conductor.

5. Conclusions

The CIGRE meetings provide a valuable opportunity to share ideas with a wide variety of manufacturers and utilities throughout the world. Descriptions of each subject is necessarily quite brief in this summary and individuals should feel free to contact me for additional information in any of the discussion areas.



William Kennedy
US Representative to CIGRE SC 12 (Transformers)

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MEETING MINUTES

DIELECTRIC TESTS SUBCOMMITTEE
October 31, 1989
Charlotte, NC

1. INTRODUCTION/ATTENDANCE

The Dielectric Tests Subcommittee met at 10:12 A.M. with 34 members and 43 guests in attendance. Allan Bartek, B. K. Patel and H. J. (Jim) Sim, have been accepted as new members of the Dielectric Tests Subcommittee.

2. APPROVAL OF MINUTES

The minutes of the April 11, 1989 meeting in Chicago, IL were approved as submitted.

3. CHAIRMAN'S COMMENTS from ADMINISTRATIVE SUBCOMMITTEE

Russ Minkwitz accepted liaison duties to the IEEE High Voltage Testing Techniques Subcommittee for their work in reviewing and updating ANSI/IEEE Std #4-1978-IEEE Standard Techniques for High Voltage Testing.

4. WORKING GROUP REPORTS

A. Working Group on Revision of Dielectric Tests
H. R. Moore

The Working Group met on October 30, 1989 with 18 members and 14 guests present.

The minutes of the April 10, 1989 meeting were approved as written.

1) Task Force on Revision of Impulse Test Guide
R. E. Minkwitz

The Task Force met at 10:05 A.M. on October 30, 1989 with 13 members and 28 guests present. The minutes of the previous meeting were approved as presented.

a. Review of August 1989 Draft of the Switching Surge Test Document.

Mr. B.K. Patel reviewed the draft of the guide for switching surge tests which had been prepared by several contributors.

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Allan Bartek prepared extensive information on the various connections to be used when performing switching surge tests on different core and winding configurations. This included termination of untested terminals for single and three-phase transformers.

Other contributions were made on the measurement of the switching surge magnitudes at non tested terminals and other details. The need to specifically exclude switching impulse tests on distribution class transformers was discussed. C57 documents will be searched to insure conformity on this question.

B. Paulin will draft a section to cover the polarity of switching impulse tests for internal insulation and techniques for performing external phase-to-phase tests.

Editorial details were reviewed. The draft will be completed and the Working Group balloted prior to the next meeting.

b. **Impulse Testing of Low Impedance Windings.**

Efforts to determine why this section was changed in the 1986 document indicate that this was an inadvertant change. A draft based on the previous document will be available at the next meeting.

c. **Digital Recording During Production Impulse Tests**

A seminar is scheduled for October 31, 1989 to review experience with digital recording during production impulse tests. Four persons will discuss experience with this method during actual tests. The Task Force will decide whether digital recording techniques should be added to the impulse test guides.

2) **Task Force on Revision of Dielectric Tests of Shunt Reactors**
W. N. Kennedy

The Task Force met at 1:00 P.M. on October 30, 1989 with 5 members and 14 guests present.

Draft 9 of ANSI/IEEE C57.21 had been balloted in the Transformers Committee. All negative ballots on Draft 8 had been resolved with the exception of one negative vote on differences in dielectric tests between dry type and oil filled shunt reactors. One set of comments involved items submitted by an emeritus member and some of his editorial comments were accepted. The negative vote supplemented the earlier position on Draft 8 that the dielectric tests on dry type and oil filled shunt reactors should be the same since they are used on the same system. This subject had been intensively reviewed at the April 1989 meeting and during the Dry Type Task Force meeting earlier on October 30, 1989. It became apparent that the question cannot be resolved.

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A summary of the efforts to resolve this issue along with the negative vote will be prepared and reviewed with the involved parties. This information will be attached to Draft 10 when it is submitted for Transformers Committee balloting.

3) Task Force on Enhancement Voltage Time Duration During Power Transformer Induced Tests

The Working Group Chairman had not completed the PAR request. However, preliminary discussion occurred to determine Working Group opinion. April 1989 meeting attendees completely agreed that the enhancement time should be reduced from 7200 cycles to 5 seconds. Several objections were expressed at this meeting even though a few users have already made the change in their specifications.

Mike Altman agreed to serve as Task Force Chairman. He will organize the Task Force and start initial efforts prior to the next meeting.

The Working Group then reviewed the Dielectric Tests Subcommittee Chairman's request to consider clarification on impulse testing of neutral terminals and for a terminal brought out from a buried tertiary. It appears that these items should be considered by the Revision of Dielectric Tests Working Group.

The meeting was adjourned at 4:00 P.M.

B. Working Group for Revision of Dielectric Testing of Distribution Transformers

John Rossetti

The Working Group met at 1:05 P.M. on October 30, 1989 in Charlotte, NC with 18 members and 21 guests present.

The minutes of the April 10, 1989 meeting in Chicago, IL were approved as written.

J. Ed Smith, Central Moloney, Stephen D. Smith and Philip J. Hopkinson, Cooper Power, were added as members of the Working Group.

1) Task Force on Low Side Surge Requirements for Distribution Transformers

R. E. Lee

The Task Force met at 8:00 A.M. on October 30, 1989 with 18 members and 9 guests and at 2:09 P.M. on October 31, 1989 with 12 members and 10 guests present in Charlotte, NC.

The minutes of the April 10 and 11, 1989 meetings in Chicago, IL were approved as submitted.

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The first draft of the Task Force Position Paper - "Secondary Side Current Surges in Distribution Transformers" was discussed. It consists of material prepared by Cal Kappeler, Chuck McMillen, Jeewan Puri and Mahesh Sampat. Additional material from Dave Smith will be added.

The Task Force discussed methods available to present the information. A technical/panel session at the 1991 IEEE PES T&D Exposition appears to provide the most diverse audience for this material.

Phil Hopkinson reported on Cooper Power Systems continuing laboratory investigation and findings. Since the April 1989 meeting, Cooper has performed additional tests involving a full scale distribution transformer, service drop, service entrance and residential load. The test configuration allows variable grounding and lightning arrester combinations and locations to be evaluated.

During the October 31, 1989 continuation, Phil provided further data on the testing.

The October 30 meeting adjourned at 9:43 A.M. and the October 31, meeting adjourned at 3:08 P.M.

2) C57.12.90 C Routine Impulse Test
for Distribution Transformers

Bill Henning reported that this document is being balloted at the Committee level. Ballots are due on December 4, 1989.

The Working Group established a Task Force, chaired by Jeewan Puri, to prepare a guide for routine impulse testing of distribution transformers. A PAR will be required. The guide will be prepared for inclusion in C57.12.98, Guide for Transformer Impulse Tests.

There being no further business, the Working Group adjourned at 2:05 P.M.

C. Working Group on Partial Discharge Tests for Transformers
G. H. Vaillancourt

The Working Group met on October 31, 1989 at 8:00 A.M. with 19 members and 27 guests present. Two new members, Jack McGill and Egon Koenig were accepted into the Working Group.

The minutes of the Chicago meeting were accepted as written.

1) Task Force for Acoustic Detection of Partial Discharge
E. Howells

The Task Force met at 10:10 A.M. on October 30, 1989 with 5 members and 11 guests present. John Holland was accepted as a new member after the meeting.

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- a. The "Trial Use Guide for the Detection of Acoustic Emissions from Partial Discharges in Oil Immersed Power Transformers", PC57.127/D2 was successfully balloted by the Transformers Committee. The balloting was:

| | |
|---------------------------------|-----|
| Ballots mailed | 108 |
| Ballots returned | 93 |
| Ballots - Approved | 76 |
| Ballots - Approved with comment | 6 |
| Abstained | 9 |
| Ballots - Not approved | 2 |
| Ballots returned - retired | 4 |
| Ballots not returned | 11 |

Negative ballots have been resolved. One negative ballot dealt with the unacceptable commercial aspects of crediting EPRI with sponsoring the work which provided the substance of the guide. A majority vote (5 to 1) to remove the sentence encouraged the negative vote to be withdrawn. The second negative was resolved unanimately after discussion and re-wording of a sentence. This discussion highlighted the complexity of interpretation of complex dissolved gas analysis resulting from variations between different units.

Other comments were essentially editorial.

- b. The new Location Guide was discussed. Work has progressed to include purely narrative descriptions of all portable systems. Discussion, for guidance, concluded that the narrative presentation was the most informative method of presentation.

The Task Force meeting adjourned at 11:50 A.M.

The Working Group agreed that the changes required to resolve the negative ballots of PC57.127/D2 were editorial in nature and would be incorporated in the draft to be sent to Rev-Com without additional balloting.

2) Task Force for Measurement of Apparent Charge
W. J. Carter

The Task Force met at 8:00 A.M. on October 30, 1989 with 12 members and 9 guests present. Allan Bartek and John Holland requested membership in the Task Force.

The minutes of the Chicago meeting were approved without comment.

- a. Partial Discharge Acceptance Levels.

Only 2 sets of test results were received since the last meeting.

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George Vaillancourt reviewed acceptance limits in use at his company and presented a summary of their results. Lively discussion of resulted in Task Force recommendation that 400 pC be added to Section 9 of C57.113 as the appropriate acceptance level.

- b. Reaffirmation of C57.113 "Trial Use Guide for Partial Discharge Measurements in Liquid Filled Power Transformers and Shunt Reactors" was discussed. This document, issued in 1988, is nearing the end of its trial period. The Task Force unanimously recommended affirmation of the document.

The Task Force adjourned at 9:45 A.M.

The Administrative Subcommittee during its meeting on Monday night, October 30, 1989, suggested that the Working Group determine if negative comment exists relative to the general acceptability of C57.113. If there is no negative comment, then the Committee should be balloted on the question to remove the words "Trial Use" from the title of the document, pending a successful ballot, the Transformers Committee would submit the document to the Standards Board for approval at its February 1990 meeting. There was no negative commentary at the Working Group level.

Discussion of partial discharge acceptance levels continued at the Working Group meeting. Participants were equally divided between adopting 300 or 400 pC. Harold Moore suggested that the term "acceptance level" be changed to "objective level" and that 400 pC be recommended. It was decided to proceed with an objective level of 400 pC.

Revision of the guide will continue with an objective to adopt a definitive pC acceptance limit.

The Working Group adjourned at 9:30 A.M.

The Subcommittee concurred that there were no negative comments regarding C57.113 and agreed with the Administrative Subcommittee and Working Group recommendation to ballot the Transformers Committee solely on the issue to remove the words "Trial Use" from its title.

5. NEW BUSINESS

None

6. ADJOURNMENT

The Subcommittee meeting adjourned at 10:56 AM.

Robert E. Lee

Robert E. Lee
Chairman

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MEETING MINUTES

DRY-TYPE TRANSFORMER SUBCOMMITTEE
Charlotte, NC
October 31, 1989

Chairman: R. E. Uptegraff, Jr.

1. Introductions/Attendance/Approval of Minutes

The Dry-Type Transformer Subcommittee met at 2:05 PM on 10/31/89. There were 16 members and 9 guests present. Following the introductions of those present, the minutes of the 04/11/89 meeting (Chicago, IL) were approved as written.

1.1 Following the above, the status reports from the various working groups and task forces were presented by their respective chairman or their chairman's alternate. See the following sections for details:

| | | |
|-------|----------------------------|------------------|
| Sec.2 | Dry-Task Reactors | Mr. R. Dudley |
| Sec.3 | Specialty Transformers | Mr. A. Iverson |
| Sec.4 | Test Code (old Cast Coils) | Mr. E. Koenig |
| Sec.5 | Thermal Problems | Mr. R. Uptegraff |
| Sec.6 | Dielectric Problems | Mr. D. Kline |
| Sec.7 | Thermal Evaluation | Mr. R. Provost |
| Sec.7 | Flammability | Mr. R. Provost |

1.2 Following Mr. Dudley's report on the Dry-Type Reactor W.G., Mr. Uptegraff pointed out that this W.G. is ancillary to the work being done by Mr. Kennedy's W.G. and Mr. McGill's W.G. and that Mr. Dudley's work is regularly submitted to the W.G.'s.

Mr. Jack McGill is the chairman of the W.G. on Shunt Reactors in the Performance Characteristics Subcommittee.

Mr. Bill Kennedy is the chairman of the T.F on Revisions of Dielectric Tests - Shunt Reactors in the Dielectric Tests Subcommittee.

1.3 The Chairman presented the report on the W.G. on Specialty Transformers. It was noted that Mr. Iverson will no longer be able to participate in the Dry-Type Subcommittee due to work reassignments. Mr. Iverson has made significant contributions to this subcommittee and will be greatly missed.

Mr. Uptegraff made a request that any member who would be interested in chairing the Working Group on Insulation Requirements for Specialty Transformers please contact him.

- 1.4 A discussion following Mr. Koenig's report ensued on Part 2 of C57.12.90 concerning the methods of performing a short circuit test. As noted in Mr. Koenig's report, Mr. Ben Allen will review it and monitor the activities of the Loss Tolerance W.G. in the Performance Subcommittee for potential inclusion or reference in C57.12.91.
- 1.5 Prior to Mr. Mutschler's report, the Chairman reported that the Loading Guide, C57.96, was published and that Mr. Mutschler had received an accommodation from headquarters on a job well done. Congratulations!!!
- 1.6 Mr. Mutschler presented the report for Mr. Kline on the Dielectric Problems W.G.
- 1.7 The Chairman presented the report on Mr. Provost's combined W.G.'s on Thermal Evaluation and Flammability.
- 1.8 Following the reports of the W.G.'s, the Chairman revealed that the recently reaffirmed "Recommended Practice for Installation, Application, Operation and Maintenance of Dry-Type General Purpose Distribution and Power Transformers", ANSI C57.94, had encountered a negative vote in the ANSI consensus process. This is presently being dealt with in the ANSI C57 Subcommittee but if it is not resolved it will be returned to the sponsoring group - the IEEE Dry-Type Transformer Subcommittee.
- 1.0 There being no further business, the meeting was adjourned at 3:00 PM.

REPORTS FROM WORKING GROUPS

2. Working Group on Dry-Type Reactors

Chairman: Mr. Richard Dudley

Ref: C57.21 - "Requirements for Shunt Reactors"
C57.16 - "Requirements for Current-Limiting Reactors"

This W.G. participates as a task force in the activities of the W.G. on Shunt Reactors chaired by Mr. Jack McGill. The W.G. provides recommendations relating to dry-type reactors as distinguished from liquid-filled reactors. Work on revision of C57.21 is essentially completed and the W.G. is now undertaking the revision of C57.16.

- 2.1 The working group met 10:05 AM on 10/30/89 with 6 members and 2 guests present. Following the introductions of those present, the minutes of the 10/31/88 meeting were approved as written.
- 2.2 Negative votes received from ballots of the Main Transformer Committee of Draft #9 of C57.21 were discussed.
 - 2.2.1 With respect to the negative vote by Mr. Linden Pierce, the decision was made to modify Table #3 based on the suggestions of Mr. Pierce in his correspondence to Mr. Jack McGill dated 09/21/89.

Essentially, the average winding temperature rises in Draft #9 will be maintained but the hottest spot winding temperature rises will be lowered to be consistent with the practice outlined in ANSI/IEEE Std 1-1986. This option was selected on the basis that the recognizable average winding temperature limits are maintained.

It was also decided to add a new note (#3) to Table #3. This note will cover the unique loading conditions mostly applicable to thyristor controlled reactors. This will be done since C57.21 is now used as a standard for such reactors as well as the traditional tertiary switched shunt reactors. The note will also cover special ambient conditions.

During the later portion of the meeting, Mr. Pierce joined the discussion and tentatively approved the above approach.

The Chairman agreed to circulate a redraft to the W.G. members by the end of November with the objective of giving a "go ahead" to Mr. McGill by 01/01/90.

2.2.2 The negative vote of Dr. Stein on the dielectric tests on dry-type shunt reactors was discussed. The key results of the discussion were:

1. Dielectric testing should take into consideration different insulation systems. A device cannot be viewed simply as a "black box".
2. End users present preferred the turn-to-turn test and felt that the induced voltage tests for dry-type shunt reactors would be of limited value in comparison.
3. The IEC reactor standard was discussed. The key observations was that the induced voltage test is a "go - no go" test with no partial discharge measurement for maximum system voltages below 300 kV. And in the dry-type transformer standard it (partial discharge) is a "special test".
4. One cannot separate testing from design and construction.

Therefore, based on the above, it was decided to recommend that the dielectric testing for dry-type shunt reactors be kept as in Draft #9 of C57.21 and accept Dr. Stein's negative vote.

2.2.3 The issue of wet tests or pollution tests labeled in Dr. Stein's correspondence was discussed.

It was pointed out that unusual service conditions are not a part of the scope of C57.21. This is covered in Section 4.1 of C57.21. however, it was decided to add a note in Section 4.1 referring the reader to Section 12 where a subsection will be added to clarify unusual service conditions for dry-type shunt reactors. It will essentially stress that care should be taken the specification, design, and testing of dry-type shunt reactors for polluted environments.

2.3 The clarification as to why a power factor test is not applicable for dry-type shunt reactors was discussed.

2.4 The proposed revision of C57.16 (Current-Limiting Reactors) and the recent correspondence of Mr. Dudley's on this subject was discussed. The key points are noted in the sections below.

2.4.1 High voltage series reactors should receive special emphasis. Perhaps there should be a separate section on the application and testing of HV series reactors; for example, bus tie and load balancing reactors.

2.4.2 An application guide similar to that in Section 12 of the shunt reactor standard should be included for dry-type series reactors.

- 2.4.3 Oil and dry-type series reactors should be included in the same standard. Therefore a protocol similar to that for the revision of C57.21 will be required.
- 2.4.4 It was agreed to eliminate standard ratings.
- 2.4.5 The results of Mr. Dudley's telephone survey of utilities was discussed. The revised standard will NOT include filter and smoothing reactors.
- 2.5 The meeting was adjourned at 12:00 noon. The Chairman stated that he would take all relevant issues to Mr. Bill Kennedy or Mr. Jack McGills W.G.'s. Additionally, the Chairman would make and submit all changes discussed, including written answers to Dr. Stein's recent correspondence, to the Transformer Committee for reballoting.

3. Working Group on Specialty Transformers - P259

Chairman: Mr. Al Iverson

Ref: IEEE Std 259 - Standard Test Procedure for Evaluation of Systems of Insulation for Specialty Transformers

This W.G. is charged with the revision of the 1974 edition of IEEE 259. This standard relates to evaluating the thermal and environmental degradation of small low voltage dry-type transformers.

- 3.1 The working group met at 1:00 PM on 10/30/89 with 4 members and 7 guests present. Chairman Al Iverson was not able to attend the meeting and Mr. Dick Provost assumed the chairmanship for the meeting. Following the introductions of those present, the minutes of the 04/10/89 meeting were approved as written.
- 3.2 Copies of the current working group membership were circulated for corrections or additions. It was noted that Mr. Iverson would be contacting those members not present to determine whether they want to remain as members of the working group.
- 3.3 Copies of Draft #4 of P259 was distributed to the working group for any additional changes or comments.
- 3.4 A copy of a proposed revision of Table 3 of P259/D4 was distributed. The table replaces the old table on page 6 of Draft #4 and is based on IEEE 991 (IEEE Recommended Practice for the Preparation of Test Procedures for the Evaluation of Insulation Systems for Electrical Equipment). After a brief explanation of the table and discussion, the revised table was approved and will be included in the next draft.
- 3.5 It was noted that Draft #5 will be issued in December, 1989, and the recommendation was made that this draft be balloted by the working group and the Dry-Type Subcommittee at the same time.
- 3.6 It was reported that Chairman Iverson had reviewed Draft #8 of PC57.12.60 at the request of Mr. Provost for purposes of liaison coordination. The document has been approved by the Transformer Committee and will be sent to the Standards Board. Mr. Iverson has judged this document is not in conflict with P259/D4 or IEEE 259. There were no objections by the working group and acceptance of the document was noted.
- 3.7 A statement by Chairman Iverson was read to the working group. Mr. Iverson intends to resign from the working group by 12/01/89 due to a new assignment within G.E. Volunteers to become the new working group chairman were encouraged to discuss this with Mr. Uptegraff. Appreciation was noted for Al Iverson's devotion to the working group and the Dry-Type Subcommittee. He will be greatly missed.
- 3.8 The meeting was adjourned at 1:30 PM.

4. Working Group on Test Code C57.12.91/PC57.12.91

Chairman: Mr. Egon Koenig

Ref: C57.12.91 - Test Code for Dry-Type Transformers

C57.12.01 - General Requirements for Dry-Type Transformers
Including Those With Solid Cast and/or Resin
Encapsulated Windings

This W.G. has the mission of revising C57.12.01 and C57.12.91, in that order, to incorporate changes and additions appropriate to Solid Cast or Resin Encapsulated Windings. At present, C57.12.01 is being prepared for publication. Work on the Test Code (C57.12.91) is just beginning.

- 4.1 The working group met at 10:05 AM on 10/30/89 with 17 members and 6 guests present. Following the introductions of those present, the minutes of the 04/11/89 meeting were approved as written.
- 4.2 The Chairman reported that C57.12.01 was being prepared for final issue and that the primary purpose of the W.G. was now to review and revise C57.12.91 to incorporate cast coils. The W.G. has granted authorization to proceed on this basis and has been designated PC12.57.91.
- 4.3 Six task forces had been organized to review allotted portions of the test code. These task forces met at 3:00 PM on Sunday, 10/29/89. The Chairman presented reports on their activities.
 - 4.3.1 Mr. Pierce's group on Chapter 11 met with 3 members and 1 guest present. The task force has made good progress and review of one more draft should clean up this chapter.
 - 4.3.2 Mr. Uptegraff's group on Pages 1 through 9 reported that this task force's work depends to a large degree on the work of the other task forces. As soon as the total document is assembled their work will proceed.
 - 4.3.3 Mr. Hollister's group on Chapters 5, 6, 7, 8, and 9 with 6 members present. He indicated that loss measurement will not be included at this time. Several editorial changes and some definitions have been clarified. Mr. Hollister has requested input from the W.G. on the accuracy of figure 20 on page 23.

- 4.3.4 Mr. Rodden's group on dielectric tests met with 3 members present. Considerable discussion in the W.G. centered around full wave and chopped wave testing. The consensus of the W.G. was that chopped wave testing should be done on windings 10 kV BIL and above. Wording to incorporate this will be added.

Several discussions ensued on partial discharge test methods and test levels. It was agreed that acceptance levels for tests would not be included in the text of the chapter but would be discussed in the forward.

- 4.3.5 Mr. Mutschler was not present and his task force did not meet. However Mr. Mutschler had previously informed Chairman Koenig that Chapter 12 on short circuit testing needed no revisions.

- 4.3.6 Mr. Iverson was not present but Mr. Cambre reported on his task force on Chapters 13, 14, and 15. Mr. Iverson has resigned as Chairman of the task force and Mr. Cambre has agreed to assume the Chairmanship for the group.

The group met with 2 members present. Mainly, they reviewed the marked up copy of the chapter that Mr. Iverson had prepared, made editorial changes, and tried to harmonize the text with C57.12.00.

Two points of interest dealt with the word "coolers" and reference to ANSI/IEEE C57.12.01.

The task force agreed with changing the word "coolers" to "external cooling features".

The task force also agreed upon replacing the reference "ANSI/IEEE C57.12.01" with "applicable American Standards".

- 4.4 A discussion from the floor addressed acoustic reflective surfaces. It was decided that this has already been covered properly. Additionally, the W.G. agreed not to become involved with the details of acoustics at this time.

- 4.5 Messrs Iverson and Marek have resigned from this working group.

Messrs Cambre, Haas, and Thomas have been accepted as new members.

- 4.6 The Chairman appointed Mr. Cambre as Chairman of the task force on Chapters 13, 14, and 15. Messrs Haas and Singh volunteered to work on Mr. Cambre's task force.

- 4.7 The Chairman requested that all completed mark-ups should be sent to him by 12/25/89. These mark-ups should be in two column, single space format.

- 4.8 The Chairman received agreement from the working group to change the name of the W.G. to "Working Group on Test Code for Dry-Type Transformers - C57.12.91 - PC57.12.91".
- 4.9 The Chairman will request double time for this W.G. at the next Transformer Committee meeting in Denver. He will request times at 10:05 AM and 1:00 PM.
- 4.10 Mr. Ben Allen agreed to review C57.12.90 Part 2 and coordinate and incorporate any relevant material into C57.12.91.
- 4.11 The meeting was adjourned at 11:59 AM.

5. Working Group on Dry-Type Thermal Problems

Chairman: Mr. Bill Mutschler

Ref: C57.96 - Guide for Loading Dry-Type Transformers

This W.G. is undertaking the review of various temperature related parameters involved in loading, overloading, and aging of dry-type transformers. This review is prompted by changes in the state of the art including new temperature ratings and insulating materials. A secondary mission is the monitoring of the consensus process now under way with C57.96.

- 5.1 The W.G. met at 4:00 PM on 10/30/89 with 13 members and 17 guests present.
- 5.2 The Chairman reported that all work was complete on C57.96 and it was now in print.
- 5.3 The Chairman reported that only 2 manufacturers had submitted thermal data to Mr. Koenig as requested at the last meeting. Mr. Koenig will send out additional forms to all manufacturers represented in the W.G. in an effort to get them to respond. The forms are to be returned to Mr. Koenig.

The Chairman reiterated the need for this data. It will be used to address the problem of the differences between IEC and IEEE with respect to hot spot allowances. It was noted that both approaches, a 1.25 multiplier or 30°C adder, while being conservative are unrealistic.

- 5.4 The Chairman reported the need for feedback on C57.96's time constant calculations.
- 5.5 The effect of harmonic loads on thermal hot spot allowances, ratings, etc., no conclusion as to what course of action would be appropriate at this time.
- 5.6 The W.G. adjourned at 5:00 PM.

6. Working Group Dry-Type Dielectric Problems

Chairman: Mr. Don Kline

Ref: PC57.124 - Recommended Practice for the Detection of Partial Discharges and the Measurement of Apparent Charge in Dry-Type Transformers

This mission of this W.G. is the development of C57.124 which is presently in Draft #5.

- 6.1 The working group met at 3:05 PM on 10/30/89 with 20 members and 10 guests present. Following the introductions of those present, the minutes of the 04/11/89 meeting were approved as written.
- 6.2 The Chairman reported that Draft #6 of the Partial Discharge Guide was mailed 10/06/89.
- 6.3 Draft #6 of the Partial Discharge Guide was discussed from an editorial and technical aspect. The main results of these discussions were:
 - Figure H was revised
 - Figure 1 was revised
 - Figures 2 and 3 were eliminated
- 6.4 Mr. Uptegraff moved, and seconded by Mr. Cambre, that Draft #7 be balloted concurrently in the W.G. and the Dry-Type Subcommittee. This motion was approved.

It was noted that Draft #7 must be held until the 12/06/89 balloting period of Draft #6 has pasted.
- 6.5 Messrs Cambre, Jonnatti, and Mitelman was accepted as new members.
- 6.6 The meeting was adjourned at 4:00 PM.

7. Working Group on Thermal Evaluation of Dry-Type Transformers
Working Group on Flammability and Toxicity of Dry-Type Transformers

Chairman: Mr. Dick Provost

Ref: C57.12.60 - Standard Test Procedures for Thermal Evaluation of Systems for Solid Cast and Resin Encapsulated Power and Distribution Transformers

This W.G. had been charged with developing C57.12.60. The work on this standard has been pretty well completed and the standard will be submitted for trial use. Trial use was employed due to the W.G. being unable to define an existing insulation system to use as a control for comparison with an insulation system under test.

Subordinate to this W.G. is a W.G. charged with monitoring developments in flammability and toxicity of dry-type transformers.

7.1 The working group met at 11:15 AM on 10/31/89 with 11 members and 12 guests present. Following the introductions of those present, the minutes of the 04/11/89 meeting were approved as written. The new title and scope for the W.G. was noted by the Chairman.

7.2 The Chairman reviewed the status of PC57.12.60, "Trial Use Standard Test Procedures for Thermal Evaluation of Insulating Systems for Solid Cast and Resin Encapsulated Power and Distribution Transformers". Copies were sent to six liaison organizations for coordination and approval. Three positive responses had been received to date. Lacking any negative responses, the document will be submitted to the Standards Board in November.

A brief discussion followed on the need for data resulting from testing based on this document. The Chairman, emphasizing the need for this data, encouraged any member user who would be willing to act as an impartial party to receive data from manufacturers to notify the him. The Chairman noted that the two year period for trial use standards to be reviewed is very short in light of the extensive testing required.

7.3 The Chairman report a summary on the July ASTM Seminar on Fire Hazard Analysis and Risk Assessment. It was noted that ASTM Committee D9 (Electrical and Electronic Insulation and Equipment) has established a new subcommittee 21 (D-9.21) to review fire performance standards.

7.4 Messrs Cambre and Mitelman were added to the membership of the W.G.

Submitted by: Wesley F. Patterson Jr.
Secretary
Dry-Type Transformer Subcommittee
January 28, 1990

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IEEE/PES TRANSFORMER COMMITTEE
INSTRUMENT TRANSFORMER SUB-COMMITTEE
Minutes for Meeting, Oct. 31, 1989
Charlotte, N. Car.

1. The meeting was opened at 8:00 AM, Oct. 31, 1989.
2. Seven members and five guests attended.
3. The place and date of future meetings was announced.
4. The chairman reminded attendees that ANSI C12.11-1987, "American National Standard for Instrument Transformers for Revenue Metering, 10 kV BIL Through 350 kV", contained dimensional requirements which are not specified in ANSI C57.13.
5. PAR 546/Draft 6 (P546/D6) was again reviewed with emphasis on table 3 and the test code for C57.13-?, "Requirements for Instrument Transformers". Table 3 will now be almost identical to the switchgear standard, ANSI C37.06-1979, table 6, for ease in correlating the two standards.
 - 5.1 John Ramboz reviewed the test code changes for the meeting.
 - 5.2 The chairman will incorporate the indicated changes and issue draft 7 of P546 for sub-committee ballot.
6. Changes in IEC Publication 185, "Current Transformers" for the accuracy classes 0.1S and 0.2S for electronic meters were discussed.
 - 6.1 It was moved, seconded, and carried that accuracy and accuracy related industry trends be discussed at the next two meetings.
 - 6.11 No changes will be made in P546/D7 accuracy requirements. However the committee will be prepared to evaluate the need for any changes in the future.
 - 6.2 Mr. Eddy So will keep this sub-committee informed of the work in PSIM (Power System Instrumentation & Measurement).
7. The chairman will distribute pertinent information on partial discharge testing prior to the next meeting.
8. The meeting adjourned at approximately 11:45 AM.

Respectfully submitted,



John N. Davis, Chairman

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MINUTES OF
INSULATING FLUIDS SUBCOMMITTEE

October 29-30, 1989
Charlotte, North Carolina

The Subcommittee met on Monday and Tuesday, October 29-30, 1989. There were 21 members and 4 guests present.

The minutes of the previous meeting in Chicago were approved as written.

MEMBERS PRESENT:

| | |
|-------------------|-----------------|
| D. W. Crofts | J. P. Kinney |
| D. H. Douglas | M. M. McGee |
| M. Frydman | R. J. Musil |
| J. L. Goudie | W. M. Mutschler |
| F. M. Gragg | H. A. Pearce |
| F. J. Gryzkiewicz | C. T. Raymond |
| F. W. Heinrichs | T. O. Rouse |
| P. J. Hoefler | D. Sundin |
| B. G. Hunter | J. A. Thompson |
| D. L. Johnson | T. P. Traub |
| J. J. Kelly | |

GUESTS PRESENT:

| | |
|----------------|---------------|
| J. G. Gibeault | J. M. Pollitt |
| R. M. Mausinec | H. W. Moore |

The Chairman reported that Guide C57.111-Silicone has been issued, and C57.121-High Temperature Hydrocarbons will be issued in early 1990.

PROJECT C57.104 - GAS GUIDE:

The Main Transformers Committee balloted Draft 8. There was a very good return of 91%. There were, however, ten negatives and several with comments. Most of the negatives concerned the values of each of the gases in Table 5.4.

The Working Group will review these negatives, and attempt to compile a revision that will be agreeable to all. It will be balloted again in the Subcommittee.

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INSULATING FLUIDS SUBCOMMITTEE
October 29-30, 1989
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PROJECT C57.106 - OIL GUIDE:

Dave Sundin distributed copies of Draft 3. They were reviewed at the meeting. Many suggestions were made, and Draft 4 will be prepared for Subcommittee ballot prior to the March 1990 meeting.

PROJECT C57.130 - GAS ANALYSIS DURING FACTORY TEST:

During factory test the working group met Monday, October 30 in Charlotte, NC. There were 5 members and 34 guests present.

MEMBERS PRESENT:

| | |
|-----------------|--------------|
| D. Douglas | R. J. Musil |
| F. W. Heinrichs | H. A. Pearce |
| J. P. Kinney | |

Absent was L. Savio.

The following new members were added:

| | |
|----------------|--------------|
| A. Delgado | J. J. Kelly |
| J. A. Ebert | J. G. Lackey |
| M. Frydman | D. Marlow |
| F. Gryzkiewicz | R. A. Veitch |

After a briefing by Henry Pearce, Chairman of the Insulating Fluids Subcommittee, the Scope section and an outline were discussed. The following assignments are to be forwarded to the chairman by January 31, 1990.

| | |
|-----------------------------------|----------------------------|
| SCOPE & INTRODUCTION | Dave Douglas |
| BACKGROUND | Frank Heinrichs |
| LAB REQUIREMENTS & SAMPLING | Henry Pearce |
| RESULTS | R. J. Musil & J. P. Kinney |
| BIBLIOGRAPHY | ALL |

s/J. P. Kinney, Chairman
Working Group on PC57.130

H. A. Pearce
Chairman

F. W. Heinrichs
Secretary

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Meeting Minutes
Insulation Life Subcommittee
of the
IEEE Transformer Committee
at the
Marriott City Center Hotel
Charlotte, North Carolina

The Insulation Life Subcommittee met on Tuesday, October 31, at 1:50 p.m. with 22 members and 38 guests in attendance.

The minutes of the April meeting in Chicago were approved as issued.

The first Working Group report was given by Bill Wrenn, Chairman of the Working Group on Guides for Loading. Bill reported that his Working Group met on Monday, October 30, at 8:00 a.m. with 26 members and 15 guests attending. Two new members have been added to the expanding Working Group, Paulette Payne and Dave Truax.

Reports on the work to combine the three oil immersed transformer loading guides into one were given.

Based on IEEE guidelines, a separate section on Definitions will be added. This will require new section numbering as follows:

1. Introduction
2. Definition
3. References
4. General
5. Distribution Transformers
6. Power Transformers

Definitions for directed and non-directed flow have successfully complete balloting and will be incorporated in the new Definition Section.

John Mathews, Chairman of the General Section Task Force, reported that Draft 4 of the General Section had a poor ballot response due to a concern for the proposed more precise alternate calculations.

A concern was raised that the use of bulk top oil in the equations on a non-direct flow transformer is very inaccurate, since much of the oil rises up outside the windings and stays relatively cool. The oil temperature that is required is that leaving the upper portion of the winding.

It was proposed that the IEC method be used which used the winding cooling curve and an average oil temperature to establish the oil temperature leaving the top of the windings.

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The alternate calculation method, and possibly the IEC method, may be moved to the Appendix to expedite the completion of the guide. Lin Pierce and Orrean Chew will write discussions on the advantages and limitations of the various calculation methods for inclusion in the Appendix.

Dave Takach, Chairman of the Distribution Transformer Section Task Force, reported that his Section is complete unless changes are made in the calculation methods.

Jerry Grimes, Chairman of the Power Transformer Section Task Force, reported that a proposal has been made, based on EPRI power transformer model tests, to eliminate the life expectancy curve for power transformers and use the distribution transformer curve for both distribution and power transformers. The proposal was defeated. Bill McNutt discussed the origin of both sets of curves and proposed a change in the scale of life expectancy curve from years of life to per unit life with the users of the guide being required to choose among several options as to the value of one per unit. There being no clear consensus as to what to do in this area, further work will be done before the next meeting.

It should be noted that many of the changes in the new guide will require revisions of the Test Code C57.12.90.

The next report was given by Bob Grubb, Chairman of the Thermal Test Working Group.

This Working Group met at 3:05 p.m. on Monday, October 30, with 7 members and 9 guests in attendance.

Bob reported that Draft 11 of P838 "Recommended Procedure for Performing Temperature Rise Tests at Loads Beyond Nameplate Rating" is nearly ready for balloting of the Transformer Committee before the spring meeting.

A spirited discussion was held on the subject of defining the term "thermal duplicate" used in C57.12.00. Several manufacturers expressed opinions on how they internally define "thermal duplicate" and it became apparent that there was no immediately acceptable definition.

Discussion then turned to recommending the factors to be considered appropriate in defining "thermal duplicate" and an attempt to establish ranges for these factors. This discussion was based largely on input from Steve Moore and Orrean Chew.

The factors recommended for this definition were:

1. Top Oil Rise and Average Oil Rise
2. Winding Temperature Gradient
3. No Load and Load Losses

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4. Same number of windings, with winding type geometrically similar
5. Same type of cooling (such as OA, FA, FOA, non directed flow)
6. Same cooling liquid
7. Same type of transformer (such as auto transformer, LTC transformer, etc.)

Attempts were then made to define tolerances. It was proposed to define the range as ± 20 percent for oil rises, winding gradient and losses. The above definition will be circulated to the Working Group for comments before the next meeting.

Under New Business it was recognized that there is a need to make changes in the thermal test portion of C57.12.90, the test code. A Task Force was set up to begin study on the needed revisions consisting of Lin Pierce, Orrean Chew and Bill McNutt.

The next report was given by Larry Lowdermilk, Chairman of the Working Group on Thermal Evaluation of Power and Distribution Transformers. He reported that they met on Tuesday, October 31, at 8:00 a.m. with a full house consisting of 12 members and 34 guests.

The main activity of this group is the Revision of C57.100 to incorporate thermal testing for power transformer insulation systems along with those for distribution transformers. A recommendation was made that, to bring the title of this proposed test procedure into agreement with other existing Standards, the words "oil immersed" should be changed to "liquid immersed". This change broadens the scope of the test procedure to include silicone and other high fire point liquids. A motion was made and unanimously approved to make this change in the test procedure title.

The next item of business was the discussion of a letter from Frank Heinrichs, which reviewed and commented on the third draft proposal for the "Design and Construction of Subassembly Models" which was submitted at the last meeting by Dean Yannucci. In summarizing the numerous comments in the letter which addressed the model design as well as the testing of the model, he concluded that, although the desire of the Working Group to specify the design and construction for a small model that fits well into laboratory procedures is appreciated, the simplifying assumptions and model extrapolations from real life are compromises which reflect on the accuracy of the comparison of the model to real life. Frank also commented that the costs to produce a model with exactly the same thermal, electrical and mechanical characteristics as a full size transformer would make the cost of such a model nearly as great as the cost of a small size, full scale transformer. He concluded that although experimenters have for years been striving for the perfect model, in the real crucial issues such as thermal life and

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dielectric margins, the simple test tube with paper, copper and oil gave us the thermal life rules, but full size prototype units are needed to qualify the overall design.

Next, Lin Pierce made a motion that a statement be added to the test procedure that would establish a criteria for a model to successfully demonstrate the life of a new insulation system. Lin's motion was that a paragraph be added to the procedure that would read as follows: "The model aging procedure shall demonstrate, through extrapolation, a life greater than 180,000 hours this is equal to 20 years at rated hot spot temperature of the transformer design being qualified." After considerable discussion of this motion, it was defeated in a close vote by the Working Group. Although this motion was defeated, general discussion of the motion emphasized the need for an improved criteria for establishing whether or not a new insulation system meets the minimum life requirements for both distribution and a power transformers. Dave Truax and Chuck McMillen both volunteered to draft proposed statements addressing this issue for consideration by the Working Group at the next meeting.

This concluded the Working Group reports and there being no additional old or new business, the Subcommittee meeting was adjourned at 3:02 p.m.

Respectfully Submitted



David H. Douglas
Chairman
Insulation Life Subcommittee

DHD:lms

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November 7, 1989

Performance Characteristics Subcommittee

Meeting Minutes - Charlotte, NC - October 31, 1989

I. Introduction/Attendance

The Performance Characteristics Subcommittee (PCS) met at 11:15 a.m. on Tuesday, October 31, 1989, with 33 members and 44 guests in attendance.

II. Approval of Minutes

The minutes of the April 11, 1989, PCS Meeting were approved as written.

III. Chairman's Remarks

A. Administrative Subcommittee Notes

The following information, obtained at the October 30, 1989, meeting of the Administrative Subcommittee was presented:

1. The next Committee meeting will be held at Downtown Marriott in Denver, CO, during March 25-28, 1990.
2. The revised Committee Operating Manual is still pending final approval of revised scopes for the Committee and the HVDC Converter Transformers and Smoothing Reactors Subcommittee. The revised manual should be available at the next meeting.
3. IEEE Standards Submittal Kits have been distributed to all Working Group Chairmen. Contact Jim Harlow if any additional kits are required.

All PCS Working Group Chairmen indicated they have received these kits.

4. The portion of the Standards Subcommittee Report pertaining to PCS projects is attached for review (Attachment PCS-A).

B. Liaison Reports

1. IEEE Power Systems Relaying Committee, Network Transformer Protection Working Group

No report was presented.

C. Membership

George Reitter (Delta Star) was added to the PCS roster.
W. E. Boettger and C. G. Evans were removed from the roster.
Membership now stands at 56.

IV. Agenda Changes

No changes were requested.

V. Working Group Reports

A. Failure Analysis - D. J. (Don) Cash

Wally Binder, Task Force Chairman, presented the following report in place of Don Cash (not present):

The Working Group met at 1:00 p.m. on October 30, 1989, in Salon C of the City Center Marriott Hotel. There were 17 members and 16 guests present.

After introductions of members and guests, the minutes of the April 10, 1989, Working Group Meeting were approved as submitted.

Wally Binder reported on the August meeting of the Task Force and Draft 8 of the guide which resulted. The Task Force satisfied itself that the equation in Appendix A1.9 was correct. The Task Force made editorial changes to incorporate various comments. The Task Force also prepared an outline for case histories (now Appendix C) in an effort to resolve the negative ballot regarding the use of case histories which resulted from the previous ballot.

The Working Group had previously indicated by show of hands at the April meeting that it wished to retain the case histories.

The Working Group discussed the use of case histories. Jerry Grimes asked the reason for case histories. The intent was to demonstrate the use of guide the case histories as presented may be incomplete because the histories were done prior to the publication or the guide. They are intended as examples.

The question was asked if we were meeting a need or satisfying potential users. Several members indicated value in the case histories.

John Bergeron volunteered to provide an introduction to the case histories to clarify their purpose.

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William Kruesi suggested that if the case histories became an impediment to a successful ballot that they could become a supplement to the guide. The opinions expressed indicated that the case histories should remain at this time.

The next question on case histories posed was the effort to provide hypothetical cases. Wally Binder cited a lack of design expertise to assure that test values could be created to make the case meaningful. When no volunteers came forward to provide the expertise, the subject was dropped.

Several members indicated a desire to move the balloting on to completion.

Next a discussion on what procedure could be used to expedite balloting. After much discussion, it was decided to revise the current ballot to clarify that it is a subcommittee ballot and after successfully balloting the subcommittee, ask its permission to ballot the main committee.

There was no other old business.

There was no new business.

The meeting adjourned at 1:45 p.m.

Following this Working Group report, the PCS Chairman added that assuming a satisfactory ballot of Draft 8 is completed in PCS, it is permissible to ballot the main Committee prior to the next meeting. Approval must be obtained from the Committee Officers, and an up-to-date mailing list must be obtained from John Borst, Committee Secretary.

B. Loss Tolerance and Measurement - W. R. (Bill) Henning

The Working Group on Loss Tolerances and Measurements met on Monday, October 30 at 3:05 p.m. with 18 members and 6 guests present. After receiving the Task Force report (shown below) the WG reviewed the scope of the guide. It was agreed that the scope would include dry-type transformers and step-voltage regulators.

The Working Group has prepared a proposal for Sections 8 and 9 of the Test Code, C57.12.90, covering no-load and load loss tests, respectively. A ballot was prepared for the Performance Characteristics Subcommittee, with returns due on December 4. In the meantime, the Working Group is reviewing Section 5 of the Test Code, which covers temperature and resistance measurements. The Working Group discussed three subjects:

1. The conditions needed to assume thermal equilibrium in measuring the winding temperature.

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2. Some of the information in this section of the present standard is not technically correct.
3. Some information should be added to cover special measurement problems, such as delta windings, booster transformer series windings, etc.

The Working Group then adjourned its meeting, and the Task Force reconvened discussion of the no-load loss section of the guide.

Loss Measurement Guide - TF Meeting 10/30/89

The meeting started at 8:00 a.m. with 8 members and 16 guests present. Four of the guests requested membership in the TF.

First item on the Agenda was a review of the decisions made in the previous TF meeting relative to the intended purpose and scope of the guide, the outline of the guide, and the proposed plan to produce the guide.

A draft of the no-load loss portion of the guide was presented and was discussed paragraph by paragraph. In addition to several editorial changes, additions and deletions, several issues came up and were discussed. These are:

1. What is the scope of the guide relative to types of transformers the guide would, or should, be applicable to? It was recommended that this item be discussed at the WG level today. It was also recommended that we look into the transformer types that are excluded from stds. C57.12.90 and 91 and see whether the guide will apply to any of them.
2. Is there a need to standardize the Form of reporting losses, impedances, etc. Decision was made that this is not feasible since different customers require different amounts of information reported. Customers can, if they so choose, provide manufacturers with their own standard Forms of reporting test data for the sake of consistency. However, required accuracies including the number of significant digits reported will be specified in Chapter 5 of the guide along with calibration techniques, requirements and traceability.

It was recommended that the guide include a list of reference standards to which this guide applies.

The meeting was adjourned at 10:00 a.m.

C. Semi-Conductor Rectifier Transformers - G. C. (Charlie) Pounds

Sheldon Kennedy, Working Group Secretary, presented the following report in place of Charlie Pounds (not present):

1. The Working Group met on Monday, October 30, 1989, at 10:05 a.m. There were 7 members, 10 guests present.
2. Minutes of the last meeting (4/10/89) as written by Roger R. Hayes, were presented, discussed and approved as written.
3. Draft 6 of C57.18.10 was not available for this meeting, however, it will be sent to the working group shortly for review.
4. General discussion of the eddy loss problem and elevated hotspot temperature under the influence of harmonics occupied most of the meeting time. The general feeling held by those present, reinforced the direction of the group as stated in the 4/10/89 meeting minutes. In addition, there was a proposal that the hotspot allowance for rectifier transformers should be higher than the standard allowances for non-rectifier transformers. The question is how much?
5. Impulse testing on 1.2 kV class loosely and tightly coupled secondary windings was discussed. The question was whether 30 kV impulse testing was appropriate for tightly coupled interleaved secondaries. This will be reviewed with the appropriate subcommittee.
6. Roger R. Hayes agreed to be the official liaison between this working group and the Dry Type Transformers Subcommittee.
7. The PCS Chairman noted that the chairman of this Working Group has requested rescheduling of the meeting time from Monday at 10:05 a.m., to Monday at 8:00 a.m. to coordinate with the Working Group on Dry Type Reactors.

D. Qualification of Transformers for Class 1E Application in Nuclear Power Stations - L. R. (Len) Stensland

Len Stensland presented the attached WG report (Attachment PCS-B).

E. Transformers Directly Connected to Generators - B. K. (Bipin) Patel

This WG did not meet during this Committee session. Bipin Patel reported that the Guide (C57.116) has been published by IEEE.

The PCS Chairman added that ANSI approval of this guide is still pending, but is expected soon, therefore the work of this WG is completed. Bipin, and the WG members, were thanked for their efforts put into this project over the past 10 years.

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F. Test Code for Shunt Reactors (C57.21) - J. W. (Jack) McGill

Jack McGill presented the attached WG report (Attachment PCS-C).

G. LTC Performance Requirements - T. P. (Tom) Traub

The LTC Performance Requirements Working Group met at 3:05 p.m. on Monday, October 30, 1989, with 12 members and 16 guests in attendance.

Introductions were made and the minutes of the previous meeting in Chicago were approved.

The Chairman informed the WG that he had sent a letter to the IEC requesting their permission to duplicate portions of IEC Standard 214, which is copyrighted material, in the new standard being developed by the WG. The new standard is designated as PC57.131, Standard Requirements for Load Tap Changers.

The Chairman reported that 18 ballots had been sent out on Draft 2 of PC57.131. Six ballots were returned as approved with comments, three as not approved, one as not voting and eight were not returned.

The next items discussed were comments that were submitted by the WG members on Draft 2 of PC57.131. Many good comments had been received, some of which were conflicting. Some of the items were able to be resolved, however, the following major items were not resolved and will require further input from the WG members prior to the next meeting:

- Overload capability requirements for load tap changers
- The type of applied voltage test to be made, as well as limits of RIV for such a test.
- The need for an appendix which would provide tutorial information on LTC application.

The WG members were requested to provide comments by February 1, on all of the unresolved items.

The WG meeting adjourned at 5:00 p.m.

Subsequent to the meeting, the Chairman reviewed the comments made at the meeting and decided that there is sufficient information available now to permit the preparation of a third draft. The Chairman will have a third draft prepared and ballots sent to the WG members before the end of the year. Returned ballots on Draft 3 will be due by February 1.

VI. Project Reports

A. LTC Position Indication - R. H. (Bob) Frazer

Bob Frazer could not attend this meeting because he was recuperating from surgery. He sent the results of the PCS ballot PC57.12.00h/D1 (Attachment PCS-D).

These results show that only 56% of the ballots have been returned. The PCS Chairman will contact Bob Frazer regarding obtaining 75% ballot return and resolution of negative ballots.

B. Nameplate Information Change Request - J. W. (John) Matthews

Project PC57.12.00i has been on hold pending definition of the terms "Directed Flow" and "Non-Directed Flow" by the WG Guides for Loading.

These definitions have now been developed. They will be attached to a revised proposal and balloted in the PCS prior to the next meeting.

VII. Old Business

PC57.12.00k - Revision of C57.12.00-1987, Table 16

Chuck McMillen reported that a successful ballot of this project has finally been obtained in the Transformers Committee (Attachment PCS-E).

VIII. New Business

- A. A request for interpretation of ANSI/IEEE C57.116-1986 was received from Mr. Thomas Gruzs, Liebert Corporation. The request (Attachment PCS-F1) involves calculation of derating factors for computer power supply transformers supplying non-sinusoidal load currents.

Bill McNutt presented a proposed response (Attachment PCS-F2). The response was approved by voice vote of the PCS with over 50% of the membership present.

Subsequent to this meeting, the PCS Chairman sent this response to Ms. Sue Vogel, PES Administrator, for transmittal to Mr. Gruzs (Attachment PCS-F3).

- B. A new item to consider in the next revision of C57.12.00 was suggested in a letter from Roy Uptegraff, Chairman Dry Type Transformers Subcommittee (Attachment PCS-G). The suggested revision of Section 4.1.6.1 regards operation above rated voltage and under rated frequency.

TC-L
8 OF 23

- 8 -

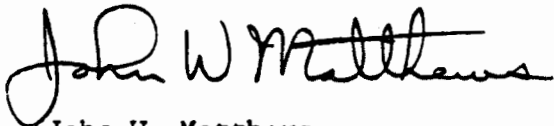
PCS members are requested to send comments regarding this suggested revision to the PCS Chairman.

IX. Next Meeting

The next meeting will be held on Tuesday, March 27, 1990, in Denver, Colorado.

The meeting was adjourned at 12:10 p.m.

Respectfully submitted,



John W. Matthews
PCS Chairman

JWM.024

Subcommittee: Performance Characteristics

Subcommittee Chairman: John W. Matthews (301/281-3775)

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS COMM. | AS OF/STATUS | PES COORD. |
|--|-------------|----------------------------|--|----------------------------------|--|-----------------------------|
| Consolidated Changes to C57.12.00-1987 | | | | | | |
| P462C (1) | PC57.12.00 | W. R. Henning | Revision of Sec. 5.9 Reference Temp. for No-Load Loss | Yes (6/79) | 4/11/89 Ready for subcommittee ballot | PSIM T & D |
| P462C (2) | PC57.12.00 | W. R. Henning | Addition to Sec. 9.3.1 Accuracy Requirements for Measured Losses | Yes (6/79) | 4/11/89 Ready for Subcommittee Ballot | PSIM T & D |
| | PC57.12.00h | R. H. Frazer | TF - change Sec. 5.12 "Nameplate Voltage Note changes for LTC" | Yes (9/86) | 4/11/89 Proposal to be prepared for subcommittee | None |
| | PC57.12.00i | J. W. Matthews | TF - Nameplate Info "Directed Flow" | Yes (12/86) | 6/2/89 - D1 ballot | None |
| | PC57.12.00k | C. J. McMillan | TF - Change Table 16 Routine Resistance Test | No | 4/6/89 - Awaiting ballot returns of TC | |
| Consolidated changes to C57.12.90-1987 | | | | | | |
| P262 E3 | PC57.12.90 | W. R. Henning | General Revision of Sec. 8 No-Load Losses and Excitation Current | Yes (6/79) | 4/11/89 Ready for subcommittee ballot | PSIM T & D |
| P262E | PC57.12.90 | W. R. Henning | General Revision of Sec. 9 Impedance and Load Losses | Yes (6/79) | 4/11/89 Ready for subcommittee ballot | PSIM T & D |
| | | | Sec. 7.3, Figures 9 & 10 reversed | | 4/11/89 Hold for C57.12.90 submittal | |
| P1098 | PC57.123 | W. R. Henning R. Girgis | Guide for Transformer loss Measurement | Yes (3/85) | 4/11/89 Scope discussion Looking for TF members | PSIM |
| P438 | None | L. R. Stensland | Qualification of Class 1E Transformers for Nuclear Power Generating Stations | Yes | 4/10/89 0/17 to be issued based on D16 ballot of main committee. | NPE SUB |
| | PC57.18.10 | C. G. Pounds | Practices and Requirements for Semiconductor Power Rectifier Transformers | Yes (6/81) | 4/11/89 D6 reworked by working group | None |
| | PC57.21 | J. W. McGill | Requirements, Terminology, and Test Code for Shunt Reactors over 500 KVA | Yes (6/88) | 8/7/89 D/9 to TC for ballot | RM T & D PSR |
| | PC57.125 | D. J. Cash W. B. Binder | Guide for Failure Investi- gation, Documentation and Analysis for Power Trans- formers and Shunt Reactors | Yes (2/87) | 4/11/89 08 being prepared. | T & D PGS PSE SUGR |
| | PC57.131 | T. P. Traub | Standard Requirements for Load Tap Changers | Yes (8/89) | 9/89 02 Issued based on IEC 214 | RM T & D |

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ATTACHMENT PCS-A

STATUS OF STANDARDS SUBMITTALS - AS OF OCTOBER 24, 1989

| <u>SubCom</u> | <u>Number</u> | <u>Title</u> | <u>Std Bd Approved</u> | <u>Published IEEE</u> | <u>CS7 Approve</u> | <u>ANSI Approve</u> | <u>Published ANSI/IEEE</u> |
|-----------------|---------------|---|----------------------------|---------------------------|------------------------|-------------------------|--------------------------------|
| Insul Fluids | PC 57.111 | Guide for Acceptance of Silicone Insulating Fluid and its Maintenance in Transformers | 2/2/89 | 9/11/89 | pending | | |
| Dry Type | PC 57.12.01 | General Requirements for Dry-Type Distribution and Power Transformers | 2/2/89 | sched 11/89 | pending | | |
| Dry Type | PC 57.12.39 | Dry-Type Transformer Through Fault Current Duration Guide | 6/1/89 | sched 11/89 | pending | | |
| Insul Fluids | PC 57.121 | Guide for Acceptance and Maintenance of Less Flammable Hydrocarbon Fluid in Transformers | 12/87 w/condx | sched early 90 | pending | | |
| Perf. Char. | PC 57.116 | Guide for Transformers Directly Connected to Generators | 1/30/89 | 9/29/89 | pending | | |
| Dry Type | PC 57.96 | Guide for Loading Dry Type Distribution and Power Transformers | 3/6/89 | No | Yes | 4/26/89 | 6/23/89 |
| Bushing | PC 57.19.101 | Guide for Loading Apparatus Bushings | 10/20/89 | 7/17/89 | pending | | |

November 3, 1989
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Minutes of Meeting - October 30, 1989

Working Group on Qualification of Class 1E
Transformers for Nuclear Generating Stations

MEMBERS PRESENT:

J. W. Grimes
W. H. Mutschler, Jr.
L. W. Pierce
D. S. Takach
L. R. Stensland

GUESTS PRESENT:

R. L. Grubb
D. W. Gerlach
W. R. Kruesi
C. R. Murray
R. A. Veitch

MEMBERS ABSENT:

C. Hurty

The Working Group met in Charlotte, North Carolina at the Marriott City Center Hotel on Monday, October 30, 1989, with five members and five guests present.

The minutes of the April 10, 1989 meeting were approved as written.

Draft 17 of P638 was sent out for ballot to the members of NPEC/SC-2 and the IEEE Transformers Committee on July 7, 1989. Out of the 140 ballots issued, 111 were returned. The voting was as follows:

83 Affirmative
16 Conditional Affirmative
5 Negative
7 Waived

111

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ATTACHMENT PCS-B

November 3, 1989
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Minutes of Meeting - October 30, 1989

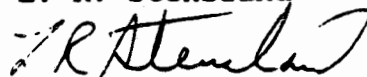
The meeting was devoted to reviewing the conditional affirmative and negative ballots. One negative ballot was not reviewed (it was received October 26, 1989). Mr. Linden Pierce will contact this person, and should be able to resolve (by editorial changes) their concern.

Four of the five negative ballots should be resolved shortly. The remaining one will be discussed further with Commentor 7.

The conditional affirmative ballots were also reviewed, except for one. The writer will contact Mr. Carl Hurty to see if he has had a chance to contact Commentor 5.

It is the consensus of the Working Group members that all conditional affirmative and negative ballots be resolved by editorial changes, or withdrawn without issuing another ballot. However, if this does not become a reality, this could be the last draft and the proposed standard may be dropped because of the lack of consensus.

L. R. Stensland



Chairman

LRS:fb

Copies:

All Members

W. R. Kruesi

J. W. Matthews

C. R. Murray

S. Vogel

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ATTACHMENT PCS-C

WORKING GROUP

REVISIONS TO TEST CODE FOR SHUNT REACTORS, C57.21

Members Present

Peter Iijima
Michel Beaulieu
Richard Dudley
Ramon Garcia Barocio
Klaus Papp
Paulette Payne
Jack McGill

Members Absent

J. Fleeman
E. Yasuda
R. Musil
S. Foster
D. Perco
J. Gerth
W. Kennedy
M. Sharp
K. Carrander
V. Raff

Guest Present

Pierre Riffon
David Ward
William Kruesi
Fred E. Elliott
(for E. Yasuda)

This working group met at 3:05 P.M. on Oct. 30, 1989 at the Marriott City Center Hotel. There were eleven (11) persons present; seven (7) members & four (4) guests.

Minutes of the last meeting in Chicago were approved as written.

The results of balloting the Main Transformers Committee were as follows:

| | |
|----------------------------|--------------------|
| Number of Ballots mailed - | 118 |
| Approved - | 79 |
| w/o comment - 68 | |
| with comment - 11 | |
| Negative Ballots - | 3 |
| Not Voting - | 13 |
| Ballots not returned | <u>23</u> |
| TOTAL: | 118 (80.5% return) |

* Ballot needed for valid ballot: 75%

The three negative votes are summarized as follows:

- 1) There was an objection to the different dielectric testing of dry-type reactors compared to the oil-immersed reactors.
- 2) The tabulation of hot spot temperature rises (in Table 3) when added to the maximum ambient temperature exceeds the Insulation Temperature class rating.

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ATTACHMENT PCS-C

Page 2

- 3) The minimum ambient temperature or oil temperature value was omitted from the standard.

Also, the oil temperature range for the design of conservators should be changed to 125 degrees C, not 100 degrees C, which is in the present standard.

Two of the three negative votes have been tentatively resolved. Table 3 will be revised to indicate normal hot spot temperature rises for each class of dry-type reactors with a note stating that under certain conditions, hot spot temperatures could be higher than shown on Table 3.

A paragraph will be added to the standard, which states that the minimum ambient temperature will be -20 degrees C (paragraph exactly the same as the transformer standard).

It was agreed that the oil temperature range for designing conservators should be 115 degrees C, which is 15 degrees C more than previous standard and was also approved by the negative voter.

The remaining negative vote cannot be resolved by the task forces or the working groups; therefore, this proposed standard will be presented to the Standards Board with a negative vote.

In addition to revising this proposed standard, the following changes were made based on accepted comments.

- 1) A paragraph was added to clarify why dry-type shunt reactors do not require an insulation power factor test (page 10, section 4.1.1).
- 2) A sentence was added to prevent restricted cooling during a heat run if thermal time constants are required by user, otherwise restricted cooling is permissible.
- 3) A paragraph was added to the Appendix stating that this is not part of the standard, but is included for information only.
- 4) Note (3), under Table 5A, will be eliminated because this note disagrees with the overvoltage value in Column 5 for the 765 kV class.

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ATTACHMENT PCS-C

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I will add the above mentioned paragraphs, including the paragraphs to satisfy two of the three negative votes, to Draft #10. Editorial corrections will also be added.

I will then reballot the Transformers Committee with only those pages containing the major corrections & changes. Included with this ballot will be a cover letter explaining the one negative ballot and the reasons why the negative vote could not be accepted.

It is expected that the reballot will be completed by the next meeting in Spring.

This meeting was adjourned at 4:30 P.M.



Jack McGill
Chairman

JM:rf

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ATTACHMENT PCS-D

The following are the results of the April 30, 1989 ballot for
C57.12.00h/D1 - REVISED WORDING - C57.12.00 TABLE 9, NOTE 4
LOAD TAP CHANGER NAMEPLATE TAP DESIGNATIONS:
(Text of old and new wording attached)

| | |
|---|----|
| Approved without comment ----- | 26 |
| Approved with comments that the word "Neutral" should be used instead of the word "Normal". (note - the word "Normal" has been in use in the LTC Standard for years and was not added in the revision for this ballot. When these changes are balloted as part of a future revision of C57.12.00, the word "Neutral" should be considered.) ----- | 3 |
| Approved with comments - "The proposed wording still leaves in doubt the direction of voltage in- crease or decrease on the output winding. The proposed definition describes increasing and decreasing voltage as if it were a property of the transformer when in many systems the voltage applied to the primary of a step down trans- former is a product of system conditions. Perhaps additional clarification is warranted." ----- | 1 |
| Not approved - "Nameplates should be referenced to the output winding with provision made under unusual service conditions for situations such as transformers that are rated for two-way operation." ----- | 1 |
| Not voting ----- | 1 |
| Total ballots returned ----- | 32 |
| Total ballots sent out ----- | 57 |

Robert H. Frazer 10/31/89

Present Wording of C57.12.00 Table 9, note 4 "Nameplate Information"

The normal position shall be designated by the letter N for load-tap-changers. The raise range positions shall be designated by numerals in ascending order, corresponding to increasing output voltage, followed by the suffix R, such as 1R, 2R, etc. The lower range positions shall be designated by numerals in ascending order, corresponding to decreasing output voltage, followed by the suffix L, such as 1L, 2L, etc. (this applies to the relationship between two windings of a transformer only, such as the H and X windings).

(PC57.12.00h/D1)

PROPOSED WORDING OF C57.12.00 TABLE 9, NOTE 4 "NAMEPLATE INFORMATION"

The normal position shall be designated by the letter N for load-tap-changers. The raise range positions shall be designated by numerals in ascending order, corresponding to increasing voltage OF THE REGULATED WINDING, followed by the suffix R, such as 1R, 2R, etc. The lower range positions shall be designated by numerals in ascending order, corresponding to decreasing voltage OF THE REGULATED WINDING, followed by the suffix L, such as 1L, 2L, etc. (this applies to the relationship between two windings of a transformer only, such as the H and X windings). IN THE EVENT THAT UNUSUAL SERVICE CONDITIONS NECESSITATE OTHER LTC TAP DESIGNATIONS, RAISE AND LOWER POSITION DESIGNATION MAY BE SPECIFIED BY THE USER.

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ATTACHMENT PCS-E

Report to the Performance Characteristics Subcommittee

Subject: Results of Balloting on Project PC57.12.00k

- Revision of ANSI C57.12.00- 1987. Table 16 to Make Resistance Measurements a Design Test for Three- Phase Distribution Transformers, Rated 501 to 2500 KVA

I am pleased to report that since my last report to this Subcommittee, we have finally achieved the required number of returns and approvals from the members of the Transformers Committee. The results are as of October 27, 1989:

| | <u>Number</u> | <u>Percentage</u> | <u>Requirement</u> |
|--------------|---------------|-------------------|------------------------|
| Members | 108 | 100 | |
| Returns | 94 | 87 | 75% minimum |
| Approve | 90 | 96 | 75% minimum of returns |
| Abstentions | 3 | 3 | |
| Not approved | 1 | 1 | |

Now that this proposal has been successfully balloted in the Transformers Committee, I can now proceed to prepare documentation for submittal to the IEEE Standards Board.


Charles J. McMillen

October 28, 1989

cc. J. W. Matthews —
J. H. Harlow

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ATTACHMENT PCS-F1



1050 Dearborn Drive, P O Box 29186
Columbus, Ohio 43229 USA
614-868-0246 Telex 246-655 LIEBERT WOGN

August 22, 1988

Secretary, IEEE Standards Board
345 East 47th Street
New York, NY 10017

SUBJECT: ANSI/IEEE C57.110-1986

Dear Sirs:

Your publication, Recommended Practice for Establishing Transformer Capability When Supplying Non-Sinusoidal Load Currents, is both welcome and needed. In the computer power industry, the load currents are almost always non-sinusoidal. Over the past year, I have surveyed many computer sites to study the harmonic neutral current problem. In the process, I have observed overheated transformers at less than rated full load phase currents. I have attempted to apply ANSI/IEEE C57.110-1986 to computer power transformers but the deratings appear to be overly conservative.

The table below summarizes my calculations. The transformers are in the range of 15 to 225 KVA. Using the manufacturer's data, I have calculated the max. Pec-r (pu) to be in the range of 1.0 to 3.0. Data for a typical transformer is: 125 KVA, 480 Volts Input, 208/120 Volts Output, 2750 Watts lost at full load, 0.0195Ω primary winding resistance (H1-H2) at 20°C and 0.00169Ω secondary winding resistance (X0-X2) at 20°C. From this data, I calculated a max. Pec-r (pu) of 1.80. Deratings for four different harmonic loads were calculated.

ANSI/IEEE C57.110-1986
TRANSFORMER NON-SINUSOIDAL LOAD CAPACITIES

| TYPE OF LOAD | CURRENT THD | $\sum I_h^2$ | $\sum I_{h h}^2$ | MAX. Pec-r (pu) | CALCULATED CAPACITY (PERCENT OF RATING) |
|--------------------------------|-------------|--------------|------------------|-----------------|---|
| Line-to-Line Power Supplies | 70% | 1.49 | 17.65 | 1.0 - 3.0 | 39% to 33% |
| Line-to-Neutral Power Supplies | 116% | 2.34 | 31.28 | 1.0 - 3.0 | 37% to 31% |
| Typical Computer Systems | 42% | 1.18 | 4.79 | 1.0 - 3.0 | 63% to 55% |
| | 23% | 1.052 | 2.25 | 1.0 - 3.0 | 80% to 73% |

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ATTACHMENT PCS-F1

ANSI/IEEE C57.110-1986
August 22, 1988
Page 2

Systems operating in excess of these calculated capacities have been observed without overheating. Typically, the transformers are three-phase, common-core, convection-cooled, dry-type transformers with Class H insulation, rated for 150°C maximum rise. In many cases, the units are operated in a computer room where the ambient temperature is only 25°C as opposed to the 40°C maximum rating.

Can you assist me in understanding your recommended practice? Does the recommended practice apply to my situation? Are the deratings overly conservative? Have I made any errors? Are there any improvements to the calculations that you suggest?

Thank you for your assistance.

Sincerely,

LIEBERT CORPORATION



Thomas M. Gruzs
IEEE Member

cc: Brad Roberts

TC-L
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ATTACHMENT PCS-F2

BERKSHIRE TRANSFORMER CONSULTANTS, INC.

Phone (413) 445-5311

Mailing Address:
P.O. Box 3437
Pittsfield, MA 01202

Office Address:
233 Eleanor Road
Pittsfield, MA 01201

November 2, 1989

SUBJECT: Standard Interpretation

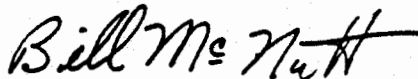
Mr. John W. Matthews
Baltimore Gas & Electric Co.
P.O. Box 1475
Baltimore, MD 21203

Dear John:

This letter will confirm the facts reported yesterday at the IEEE Transformers Committee meeting regarding an interpretation of C57.110-1986, "Recommended Practice for Establishing Transformer Capability When Supplying Nonsinusoidal Load Currents" for Mr. Thomas M. Gruz of Liebert Co. I contacted Mr. Gruz by phone to discuss his question, which was based on his concern for the amount of derating required for a particular application of small transformers if he used the method given in section 5.4 of the above document. I pointed out to him that the calculations in that section are based on assumptions about eddy loss at the conductor hot spot location. These assumptions are always conservative, as noted in the document, but for the very small transformers he was concerned with, the assumptions may be excessively conservative. I also pointed out that a more accurate, and less conservative result can be obtained if the calculation method of section 5.3 is used. This requires some design information from the manufacturer and I suggested that he try to obtain that information if he wants a more accurate and less conservative result from his calculations.

This action was approved by a voice vote of the Performance Characteristics Subcommittee of the Transformers Committee on October 31, 1989.

Sincerely yours,



William J. McNutt

TC-L
22 OF 23 ATTACHMENT PCS-F3



**TRANSFORMERS
COMMITTEE**

POWER
ENGINEERING
SOCIETY

Please Reply To:

Baltimore Gas and Electric Co.
Electric Test Department - RBC
Baltimore, MD 21203-1475

November 8, 1989

Ms. Sue Vogel, PES Administrator
IEEE Standards Office
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331

SUBJECT: Interpretation of ANSI/IEEE C57.110-1986
Requested by Mr. Thomas M. Grusz

Dear Ms. Vogel:

I have attached a response to the August 22, 1988 request by Mr. Grusz.

This response was presented by Mr. W. J. McNutt at the October 31, 1989, meeting of the Performance Characteristics Subcommittee. The response was approved by voice vote of the Subcommittee with over 50% of the membership present.

Please convey the response to Mr. Grusz, and let me know if additional information is required.

Sincerely,

A handwritten signature in cursive script that reads "John W. Matthews".

John W. Matthews, Chairman
Performance Characteristics Subcommittee

JWM.033/mdh

cc: Messrs. J. H. Harlow
W. J. McNutt
R. A. Vietch

TC-L
23 OF 23

- ATTACHMENT PCS-G -



THE INSTITUTE OF
ELECTRICAL AND
ELECTRONICS
ENGINEERS, INC.

PLEASE REPLY TO:

R. E. Uptegraff, Jr.
R. E. UPTEGRAFF MFG. CO.
P. O. Box 182
Scottdale, PA 15683

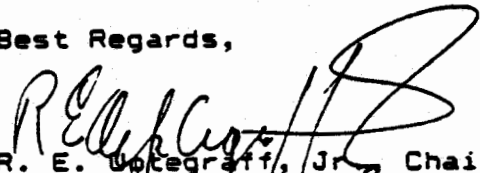
April 24, 1989

Mr. John Borst, Chairman
Performance Characteristics Subcommittee
IEEE Transformers Committee
Westinghouse Electric Corporation
P.O. Box 883
Jefferson City, MO 65102

Dear John:

A transformer with, for example, 7.8% reactance, 1.78% resistance or 8% impedance and a regulation of 5.8% at 80% P.F. will have a primary volts in excess of 110% (110.8%) when supplying rated kVA at 105% of rated secondary volts. One of our member's company had a problem with this because the general requirements (C57.12.00 and C57.12.01) place a 110% limit on primary voltage. May I submit that consideration be given to putting an upper limit of 110% primary voltage when secondary voltage exceeds its rated value. As a suggestion in C57.12.00, Section 4.1.6.1(a) may be written to state: (a) Secondary voltage and volts per hertz do not exceed 105% of rated values if primary voltage and voltage per hertz do not exceed 110% of rated values.

Best Regards,


R. E. Uptegraff, Jr., Chairman
Dry Type Transformer Subcommittee

REUjr/sjb

cc: J. Harlow
W. Patterson

WEST COAST TRANSFORMER SUBCOMMITTEE

Long Beach, California
July 13, 1989
Meeting Minutes

Attendees:

| <u>NAME</u> | <u>COMPANY</u> | <u>MEMBER/ GUEST</u> |
|--------------------------------|---------------------------|--------------------------|
| Ray Allustiarti | SAI Engineers | M |
| Dennis Gerlach (Chairman) | Salt River Project | M |
| D.A. Gillies | Consultant | M |
| Bill Isberg | Isberg & Associates | M |
| James Kinney | General Electric Co. | G |
| Bob Norton | Cooper Power Industries | M |
| Samuel Oklu (Vice Chairman) | LA Dept. of Water & Power | M |
| William Revell | Nevada Power Co. | G |
| Denise Roth | Westinghouse/ABB | M |
| David Sundin | Cooper Power Systems | M |
| Lou Tauber (Secretary) | Corps. of Engineers | M |
| C.F. Todd | Tacoma City Light | M |

The meeting was called to order at 3:30 pm. Members and guests were introduced.

The meeting minutes from the meeting of November 1, 1988 were approved without corrections.

Membership: James Kinney, Jr. of General Electric and William Revell of Nevada Power Company, were accepted for membership into the WCTSC (West Coast Transformer Subcommittee).

Future Meetings: It was mentioned that a November meeting of the Installation and Fire Protection Groups should be held somewhere on the West Coast, with a full meeting of the WCTSC held in Denver, in the Spring of '90.

Working Group Reports:

PC57.120-Loss Evaluation Guide for Power Transformers and Reactors, Chairman R. Jacobsen: The guide has completed balloting of the Transformer Committee. Roger Jacobsen will submit the guide to the Standards Board in time for the February meeting.

PC57.93-Guide for Installation of Liquid Immersed Power Transformers, Chairman J. Gillies: Dennis proposed to make Jim Gillies the Chairman of the Guide. there was unanimous approval. Draft 2 was reviewed by the working group. The

TC-M
2 OF 2

West Coast Transformer Subcommittee
Meeting Minutes/July 13, 1989
Page 2

WCTSC will be balloted for more detailed comments. The goal is for a returned guide by mid October, and ballot the main committee in one year. The date that the guide will be removed by the ANSI Standard is the end of '90.

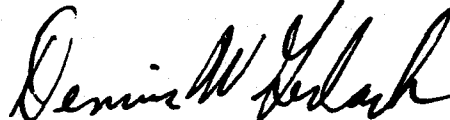
PC57.128-Fire Protection of Outdoor Liquid Immersed Power Transformers, Chairman H. Johnson: The submitted PAR was approved. Assignments have been finalized, and the first draft is due to the Chairman by October 15, for a November working group meeting.

PC57.114-Seismic Guide for Power Transformers and Reactors, Chairman S. Oklu: Negative ballots at the committee level has been completed. Liaison activities have been completed with the Substation Committee. At present, work is being completed to resolve liaison comments from the Nuclear Engineering Society liaison. It is believed these can be resolved with editorial comments.

General Discussion: Jim Gillies suggested that a maintenance guide be initiated in the future. This should be kept in mind after the Installation, Fire Protection, and Seismic Guides are completed. The main committee should be approached about giving the new guide to the WCTSC.

MEETING ADJOURNED

Respectfully Submitted,



Dennis W. Gerlach
Chairman
West Coast Transformer Subcommittee



October 26, 1989

TC-N
1 OF 2

TO: Mr. John D. Borst
Secretary, IEEE Transformers Committee
Westinghouse ABB Power T&D Company
P.O. Box 883
Jefferson City, MO 65102

FROM: Stan Lindgren, Project Manager *SL*

SUBJECT: EPRI LIAISON REPORT

The following report is for inclusion in your minutes for the November 1, 1989 meeting.

1. EHV Converter Transformer:

- Test results confirmed 25% or greater major insulation size reduction can be attained with some further work.
- Final report is being published.

2. Amorphous Steel For Power Transformers:

- Improved through-put in the lamination consolidation process has been accomplished.
- A pilot facility automated cutting line is being fabricated.
- No problems have been reported with 500 kVA unit installed and placed in service June 1987. Core loss has declined several percent since the unit was installed.

3. Advanced Power Transformer:

- Reduced load loss feasibility has been demonstrated.
- Detailed analytical studies exploring individual design aspects has been completed.
- Phase II is underway which involves building a number of physical models to verify the design studies.

4. Static Electrification in Power Transformers:

- Suspected failure mechanism in over ¹⁸12 core form and shell form FOA transformers worldwide.

*Just Seminar in
Nov '89 at Princeton*

- Four basic physical mechanisms and more than ten variable parameters have been identified.
- Work is now focused on monitoring instruments and quantification of parameters for mathematical models.
- A project is underway to monitor a large FOA transformer in the field.

5. Bubble Evolution in Overloaded Transformers:

- Very rapid load changes can cause bubble formulation under some conditions and reduce 60 Hz and impulse dielectric strength. This has been demonstrated in models with rapid/high O.L.
- Supplemental project is in process with Westinghouse-ABB to better identify moisture conditions associated with bubbles and verify GE mathematical model.

6. Power Transformer With Two-Phase Cooling:

- 75% perchlorethylene, 25% oil.
- 65 MVA unit went into full service October 31, 1986.
- Unit is carrying normal load without incident including temporary 15% above nameplate.
- Final Report is being published. *EL6 794 published*

7. Active Transformer Noise Cancellation System:

- Noise reduction in one direction is being pursued first.
- An initial evaluation on a substation transformer was completed that demonstrated over 10 decibel reduction of 120 Hz with a small trial system.
- Two systems are being linked together to handle a larger transformer and improve reduction of higher frequencies.

SRL:sf:BORST

cc: Stig Nilsson
Bob Veitch