



MINUTES OF THE
IEEE TRANSFORMERS COMMITTEE MEETING
NOVEMBER 4, 1987
NEW ORLEANS, LOUISIANA

IEEE TRANSFORMERS COMMITTEE
MEETING
NOVEMBER 4, 1987
NEW ORLEANS, LA

MEMBERS OR REPRESENTATIVES PRESENT (74)

- | | |
|--|-------------------------------------|
| 1. B. F. Allen | 38. E. Koenig |
| 2. R. A. Allustiarti | 39. J. G. Lackey |
| 3. E. H. Arjeski | 40. R. E. Lee |
| 4. J. C. Arnold | 42. L. A. Loudermilk |
| 5. J. J. Bergeron | 43. R. I. Lowe |
| 6. W. B. Binder, Jr. | 44. M. L. Manning |
| 7. J. V. Bonucchi | 45. J. W. Matthews |
| 8. J. D. Borst (rep. by D. Basel) | 46. K. T. Massouda |
| 9. C. V. Brown | 47. R. E. Minkwitz, Sr. |
| 10. D. J. Cash | 48. H. R. Moore |
| 11. O. R. Compton | 48. W. E. Morehart |
| 12. F. W. Cook | 49. R. J. Musil |
| 13. D. W. Crofts | 50. W. H. Mutschler, Jr. |
| 14. D. H. Douglas | 51. J. W. McGill |
| 15. F. Elliott | 52. C. J. McMillen |
| 16. C. G. Evans | 53. W. J. McNutt |
| 17. D. J. Fallon | 54. B. K. Patel |
| 18. M. Frydman | 55. H. A. Pearce |
| 19. H. G. Fischer (rep. by T. Prevost) | 56. D. Perco |
| 20. R. L. Grubb | 57. J. M. Pollitt |
| 21. F. J. Gryszkiewicz | 58. T. J. Prevost |
| 22. G. Gunnels, Jr. | 59. L. J. Savio |
| 23. J. H. Harlow | 60. R. B. Stetson |
| 24. F. W. Heinrichs | 61. L. Swenson |
| 25. W. R. Henning | 62. A. L. Tanton (rep. by D. Basel) |
| 26. K. R. Highton | 63. R. C. Thomas |
| 27. P. J. Hoefler | 64. J. A. Thompson |
| 28. C. R. Hoesel | 65. T. P. Traub |
| 29. R. H. Hollister | 66. D. E. Traux |
| 30. C. C. Honey | 67. R. E. Uptegraff, Jr. |
| 31. F. Huber, Jr. | 68. G. Vaillancourt |
| 32. C. Hurty | 69. R. A. Veitch |
| 33. A. M. Iverson | 70. L. B. Wagenaar |
| 34. R. G. Jacobsen | 71. R. J. Whearty |
| 35. F. D. Johnson | 72. W. E. Wrenn |
| 36. C. P. Kappeler | 73. A. C. Wurdack |
| 37. J. J. Kelly | 74. D. A. Yannucci |
| 37. W. N. Kennedy | |

IEEE TRANSFORMERS COMMITTEE
MEETING
NOVEMBER 4, 1987
NEW ORLEANS, LA

MEMBERS ABSENT (45)

- | | |
|----------------------------------|----------------------------------|
| 1. L. C. Aicher | 23. E. J. Kelly |
| 2. D. J. Allan | 24. A. D. Kline |
| 3. S. J. Antalis | 25. W. Lampe |
| 4. J. Aubin | 26. H. F. Light |
| 5. P. L. Bellaschi | 27. L. W. Long |
| 6. S. Bennon | 28. H. B. Marjolis |
| 7. G. H. Bowers | 29. S. P. Mehta |
| 8. J. Corkran | 30. C. K. Miller |
| 9. J. D. Douglass | 31. C. Millian |
| 10. J. C. Dutton | 32. M. I. Mitelman |
| 11. J. K. Easley | 33. L. S. McCormick |
| 12. <u>J. A. Ebert</u> - present | 34. E. T. Norton |
| 13. R. L. Ensign | 35. R. A. Olsson |
| 14. P. P. Falkowski | 36. C. A. Robbins |
| 15. S. L. Foster | 37. W. E. Saxon |
| 16. H. E. Gabel, Jr. | 38. V. Shenoy |
| 17. D. A. Gillies | 39. <u>W. W. Stein</u> - present |
| 18. G. Hall | 40. L. R. Stensland |
| 19. G. W. Iliff | 41. E. G. Strangas |
| 20. D. C. Johnson | 42. V. Thenappan |
| 21. A. J. Jonnatti | 43. F. Vogel |
| 22. R. B. Kaufman | 44. A. Wilks |
| | 45. E. J. Yasuda |

IEEE TRANSFORMERS COMMITTEE
MEETING
NOVEMBER 4, 1987
NEW ORLEANS, LA

GUEST LIST (56)

- | | |
|---------------------|-----------------------|
| 1. M. S. Altman | 29. R. L. Lane |
| 2. J. L. Akers | 30. S. Lindgren |
| 3. D. A. Barnard | 31. A. J. Martinez |
| 4. A. Bartek | 32. G. McCrae |
| 5. D. Basel | 33. L. D. Miller |
| 6. M. Beaulieu | 34. S. P. Moore |
| 7. C. Benisch | 35. L. Nicholas |
| 8. T. F. Brennan | 36. S. K. Oklu |
| 9. J. G. Bryant | 37. S. H. Osborn, Jr. |
| 10. K. Carrander | 38. W. Patterson |
| 11. W. J. Carter | 39. V. Q. Pham |
| 12. J. Dragon | 40. L. W. Pierce |
| 13. P. Iijima | 41. C. G. Pounds |
| 14. J. A. Forrest | 42. T. Prevost |
| 15. M. Franchek | 43. B. Ram |
| 16. J. M. Frank | 44. R. N. Rahangdale |
| 17. R. H. Frazer | 45. C. Raymond |
| 18. R. Garcia | 46. G. J. Retiter |
| 19. R. E. Gearhart | 47. J. Rossetti |
| 20. D. W. Gerlach | 48. V. S. Sankar |
| 21. J. Goudie | 49. D. N. Sharma |
| 22. P. J. Hopkinson | 50. T. Shkordoff |
| 23. E. Howells | 51. S. D. Smith |
| 24. J. W. Hupp | 52. A. M. Teplitzky |
| 25. L. Jump | 53. W. B. Uhl |
| 26. E. W. Kalkstein | 54. H. J. Windisch |
| 27. S. P. Kennedy | 55. G. R. Woollerton |
| 28. G. A. Klein | 56. F. N. Young |

IEEE TRANSFORMERS COMMITTEE MEETING
November 4, 1987
New Orleans, Louisiana
Minutes of Meeting

The meeting began at 8:30 A.M. with 74 members and 56 guests in attendance with Chairman Olin Compton presiding.

1. Chairman's Remarks and Announcements - Olin Compton

Chairman Compton opened the meeting by thanking the host, John Bergeron of Louisiana Power and Light Co. for the arrangements which were made for the meeting. He made note of his written reports which had been distributed at registration. See ADCOM Minutes Attachment 11-87-B-2.

2. Minutes of May 13, 1987 - Olin Compton

The minutes of the preceeding meeting on May 13, 1987 at Ft. Lauderdale, Florida were approved with the attached list of editorial/typographic corrections (Attach. 11-87-A) to the minutes.

3. Reports of Subcommittees

3.0 Administrative Subcommittee - Olin Compton

Mr. Compton reported that due to increasing costs and the desire to maintain our present format including the morning breakfast it was necessary to make the following changes in registration fee policy:

1. The maximum registration fee which may be charged for meeting participants was increased to \$50.00.
2. A spouses registration fee of up to \$20.00 was authorized.

Mr. Compton announced the following new Members of the Transformers Committee:

Charles Brown
Wallace Binder
Tito Massouda
W. E. Morehart
Dennis Johnson
David Sundin
Tor Orbeck

Florida Power & Light Co.
Ohio Edison
Ferranti-Packard Ltd.
Westinghouse
Bonneville Power Assoc.
RTE
Dow Corning

Future Meetings of the Committee were announced as follows:

Doble

10/4-7, 1988
 4/3-7, 1989
 10/3-6, 1989
 4/2-6, 1990
 10/2-5, 1990
 10/1-4, 1991

Date	Location	Host	Hotel
April 10-13, 1988	Washington, D.C.	Jim Arnold	Park Terrace
November 6-9, 1988	Long Beach Ca.	Roger Ensign	Ramada Renaissance
April 2-5, 1989	Chicago	Len Stensland	Drake Hotel
Fall, 1989	Charlotte, N.C.	Tentative	-
Spring, 1990	Denver, Co.	Felix Cook	-
Fall, 1990	Montreal, Canada	Tentative	-
Spring, 1991	Phoenix, tentatively		

A written report on the Administrative Subcommittee Meeting is Attached (Attach. 11-87-B)

3.1 Audible Sound and Vibration - A.M. Teplitsky

The Subcommittee met on November 3, 1987 with 6 members and 10 guests present. The Chairman reported that three of the guests requested membership on the Subcommittee. The meeting was primarily devoted to planning for the November 3 Audible Sound and Vibration Seminar and discussion of several issues which were later resolved at the Seminar. Mr. Teplitsky reported that the Seminar was very successful and provided new direction for the Subcommittee. Draft No. 5 on a new noise measurement standard will be sent to the Subcommittee before the next meeting. A written report on Subcommittee Activities and Minutes of their November 3, 1987 Meeting is attached (Attach. 11-87-C).

3.2 Bushing Subcommittee - L. B. Wagenaar

See Attachment 11-87-D.

3.3 HVDC Converter Transformers & Reactors Subcommittee - W. N. Kennedy

See Attachment 11-87-E

3.4 Dielectric Tests Subcommittee - R. E. Lee

The Chairman announced that George Vaillancourt will be assuming Chairmanship of the Working Group on Partial Discharge Tests for Transformers and Harold Moore will be assuming Chairmanship of the Working Group on Revision of Dielectric Tests.

It was noted that the "Trial Use Guide for Partial Discharge Measurement in Liquid Filled Power Transformers and Shunt Reactors" was approved as submitted to the Standards Review Committee. It is expected to be incorporated in the C57 Book. It was announced that Mr. W. J. Carter will be Chairman of the Task Force for Measurement of Apparent Charge which will now move into data collection. It was noted in response to a question by Dave Douglas that there is a request for users to collect simultaneous data on apparent charge levels and RIV levels during transformer testing. Dean Yannucci stated that Westinghouse will make such simultaneous measurements at both its St. Louis and Muncie factories.

It was reported that authorization was received, from the Administrative Subcommittee, for the establishment of a Task Force dealing with Low Side Surge Requirements for Distribution Transformers with a Scope consisting of problem definition; data collection and analysis; and determination if a test is required.

A written report was submitted by Mr. Lee which addressed the remaining items covered by the Subcommittee. See Attachment 11-87-F.

3.5 Dry Type Transformers Subcommittee - R. E. Uptegraff

The Subcommittee Chairman presented a report which is included as Attachment 11-87-G.

Mr. Compton commented on the two parallel efforts presently underway regarding symbols in the Loading Guide Group and Dry Type Transformer Subcommittee as well as an IEEE Guide on Symbols which was recently received. Note was made of the need to resolve any differences in these approaches. He hopes to resolve these questions through correspondence prior to the next meeting.

Mr. Compton also commented on a seeming absence of user voices in some of the oral discussion of maximum temperatures, insulation system rise temperatures and average winding temperatures especially as involved in comparing cast coil and conventional dry type construction. He urged additional user input to insure successful ballots in the future.

Mr. W. Muchler addressed the symbology problem and spoke strongly in favor of continued efforts to resolve symbology differences between various guides. He felt that much work was needed in this area to eliminate the presence of overlapping symbols which mean different things within different guides within the IEEE.

3.6 Instrument Transformers Subcommittee - Ralph Stetson

See Attachment 11-87-H

Mr. Compton requested that Messrs. Wagenaar and Stetson review the issue of Bushing CT's and determine if a common approach is feasible with active involvement of members of both Subcommittees.

A question regarding what Standards covered CCVT's was raised by Mr. Honey. Mr. Stetson indicated that they were covered by C93, not by the Instrument Transformer Subcommittee. Mr. Honey felt that the Subcommittee should review CCVT's and Mr. Compton indicated that this would be considered. We currently are handling a C93 ballot through the Subcommittee and have a formal liaison with C93.

3.7 Insulating Fluids Subcommittee - H. A. Pearce

See Attachment 11-87-I.

3.8 Insulation Life Subcommittee - D. H. Douglas

See Attachment 11-87-J.

3.9 Performance Characteristics Subcommittee - J. D. Borst

Dana Basel presented a report for the Subcommittee on behalf of Mr. Borst. See Attachment 11-87-K. It was announced that Charles Pounds will be assuming Chairmanship of the Semi-Conductor Rectifier Transformers Working Group.

3.10 Recognition and Awards Subcommittee - D. A. Yannucci

Certificates of Appreciation were awarded to the following members:

L. S. McCormick for Past Chairmanship of the Dielectric Tests Subcommittee.

Leonard R. Smith for Past Chairmanship of the Standards Subcommittee.

Ralph Stetson for Past Chairmanship of the Instrument Transformers Subcommittee.

Congratulations were extended to these three individuals in the recognition of their contributions.

A written report was submitted by Mr. Yannucci. See Attachment 11-87-L.

3.11 Transformer Standards Subcommittee - James Harlow.

Mr. Harlow reported that upon inspection of available PAR's on file at IEEE, there are 8-10 projects for which there is apparently no PAR. Since this review several were received leaving 5-6 for further review. He will correspond with appropriate W. G. Chairmen.

It was noted that C57.16 and C57.99 will be rescinded without further action on the part of the Committee. Messrs. Uptegraff and Dudley will offer input to Mr. Harlow on this matter.

Mr. Harlow asked that everyone note the IEEE's standard request that copies of all drafts of standards documents and minutes of all meetings on standards projects should be forwarded to the Secretary of the IEEE Standards Board. This is a lot of paper but they do want it.

For the remainder of Mr. Harlow's report see Attachment number 1 to the ADCOM Minutes. (Attach. 11-87-B-1)

3.12 West Cost Subcommittee - D. W. Gerlach

The Subcommittee last met on July 16, 1987 at the Summer Power Meeting with 9 members and 5 guest present. The Subcommittee membership stands at 16 members.

The Loss Evaluation Guide C57.120, Draft 14 is being balloted within the Transformers Committee. The Working Group responsible for this Guide met Monday with 3 members and 13 guests present.

The Transformer Seismic Guide, C57.114 is out for balloting at the Subcommittee level.

Consolidation of the Transformer Installation Guide C57.93 has not progressed due to illness of the Chairman. Jim Gillies will serve as Vice-Chairman and will begin moving this document.

A transformer fire Protection Guide has been at the discussion level and a PAR is being prepared.

A discussion of Subcommittee Members' problems and concerns included a three phase shunt reactor failure and alternate fluids for transformers.

4. Reports of Liaison Representatives

4.1 EPRI - Stan Lindgren

See Attachment 11-87-M

4.2 Discussion of Other Liaison Reports

Standards Coordinating Committee No. 4 and 4.1 - Dr. M. L. Manning. See Attachment 11-87-N-1.

CIGRE Study Committee - W. J. McNutt. See Attachment 11-87-N-2.

ANSI C57.12.2 Subcommittee on Distribution Transformers. - C. P. Kappeler. See Attachment 11-87-N-3

PES - Surge Protective Devices and ASC 62 - E. J. Yasuda. See Attachment 11-87-N-4.

ANSI C89 - S. J. Antalis See Attachment 11-87-N-5.

5. Technical Papers for Future IEEE/PES Meetings - R. A. Veitch

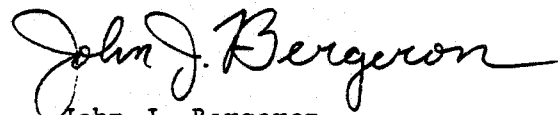
Mr. Veitch presented a detailed report which is included as Attachment No. 3 to the Administrative Subcommittee Report. See Attachment 11-87-B-3. It was noted that someone who is asked to review a paper may get another person in his organization, who is competent, to review it and send in the form. He also encouraged use of Fax machine transmission due to the tight time schedules. Note was also made of the Transformers Committee's rejection rate on submitted papers which is rather high, approaching 50%, as well as the absolute necessity of discharging paper review duties in a timely fashion.

6. New Business

The Secretary was asked to include a Revised Roster with the minutes which are sent to Transformers Committee Members.

The meeting adjourned at 11:30 A.M.

Respectfully Submitted,



John J. Bergeron
Secretary

LP220808ESU

IEEE TRANSFORMER COMMITTEE
 Minutes of May 13, 1987
 Erratum Sheet
 Compiled November 4, 1987

p.6 Section 3.4, par.1., line 3, "Routine Impulse..."

ATTACHMENTS

5-87-A(2) par. 3, line 1, "Metal Oxide Surge Arresters..."

5-87-A(8) par. (1), "Part I - Purpose and Scope"

5-87-A(8) par. (last), line 6, "potential devices..."

5-87-E p.2, par. 3, line 5, "C57.12.30 - 1965"

5-87-E p.3, par.(last) "Roy Uptegraff"

5-87-E1 p.2, par.6, change N57.15 to C57.15

5-87-E(3) par.1, line 2 "Task Forces of the..."

5-87-E(3) pages 9 and 10 should be transposed in order

5-87-G p.2, par.3, line 8 "Manitoba"; line 12, "design"



J. J. Bergeron

IEEE Transformers Committee

Minutes of

Administrative Subcommittee Meeting

Monday, November 1, 1987

New Orleans, LA

Attendance: Members:

O. R. Compton
R. A. Veitch
J. J. Bergeron
A. M. Teplitzky
W. N. Kennedy
R. E. Lee
R. E. Uptegraff
R. B. Stetson
D. H. Douglas
H. A. Pearce *L.B. Wageraar*
D. A. Yannucci
J. H. Harlow
D. W. Gerlackh
D. Basel, Representing J. D. Bost

Guests:

F. Huber
J. Arnold
C. Ten Haagen

The Administrative Subcommittee met at 6:30 P.M. with 14 members, 3 guests, and 1 member representative present.

The minutes of the May 11, 1987 meeting were approved as mailed subject to correction of some typographical errors.

A discussion of Committee Finances and Meeting arrangements resulted in the agreement that in certain cities the current fees can not provide for continuation of the desired meeting format. Therefore it was moved by John Bergeron and seconded by Allan Teplitzky that a registration fee up to \$50 would be allowed, depending on the needs of the host to complete his arrangements. The motion carried unanimously. Secondly, a motion to allow a spouse's registration fee up to \$20 depending on the needs of the host was made by R. Vietch and second by W. Kennedy. The motion also passed unanimously. The intent of these motions is to allow discretion on the part of the host in setting these fees up to the limits allowed.

ATTACH. 11-87-B

Future Meetings of the Committee were announced as follows:

April 10-13, 1988	Washington, D.C. Park Terrace Hotel
November 6-9, 1988	Long Beach CA, Ramada Renaissance
April 2-5, 1989	Chicago, Drake Hotel
Fall, 1989	Charlotte (Tentative)
Spring, 1990	Denver CO
Fall, 1990	Montreal (Tentative)

Standards Coordinating Committee - Jim Harlow

Mr. Harlow submitted the attached report (ATTACH 11-87-B-1). He noted the lack of PAR'S for many projects. Each Subcommittee Chairman was asked to follow-up on this with their Working Group Chairmen. There was also a discussion of liaison representatives and note was made of the need for certain information from them.

Technical Council Activities - Olin Compton

Mr. Compton submitted a written report to the Committee as well as another report given at the Summer Power Meeting, copies of which are attached (ATTACH #2).

Liaison Activities Report

Mr. T. Massouda was appointed as C-93 Liaison by Mr. Ralph Stetson.

Our liaison with CIGRE was discussed by Dean Yannucci. W. J. McNutt's term will soon expire. Mr. Yannucci informed the group that his Company would support Mr. W. Kennedy for this position. It was agreed that the Transformers Committee would also support Mr. Kennedy. The CIGRE National Committee will be responsible for the ultimate selection.

Liaison to IEC ^TPC14 was discussed with no resolution as to how we can develop a positive representation to this committee.

Papers for Future Meetings - Robert Veitch

Mr. Veitch presented a detailed written report which contained an excellent chronology of the process. (ATTACH 11-87-B-3). During discussion it was noted that very poor use of the English language was grounds for a rejection during the review process.

Subcommittee Reports

A. HVDC Converter Transformers and Reactors - W. Kennedy

Mr. Kennedy reported on the Guide under development in his Subcommittee. A question was raised regarding Partial Discharge Tests on Converter Transformers and which group should handle this matter. The Chairman asked that this subject be developed within the Dielectric Tests Subcommittee. It was noted that Mr. Vaillancourt was also involved in D. C. applications.

B. Bushings - Loren Wagenaar

It was noted that a Working Group was needed to develop a document pertaining to D. C. Bushings. It was decided that Mr. Kennedy's Subcommittee and Mr. Wagenaar's Subcommittee would develop a scope and describe what is to be covered. The document would be developed under the Bushing Subcommittee. It was moved by Mr. Wagenaar and seconded by Mr. Yannucci that a Working Group be set up to treat all aspects of Converter Transformers and Smoothing Reactor Bushings. The motion passed unanimously.

Mr. Wagenaar then discussed the need for standards or guides pertaining to Bushings on Distribution Transformers. It was felt that we are ready for a Task Force on this subject. This will be pursued within the Subcommittee.

C. Audible Sound and Vibration - Allan Teplitzky

Mr. Teplitzky discussed the seminar which will be presented at this meeting and stressed the need for feedback on this subject.

D. West Coast - Dennis Gerlach

The Loss Evaluation Guide now out for Transformers Committee Ballot was discussed as was the Seismic Guide which is also being balloted at the Subcommittee level.

It was reported that Jim Gilles will be coordinating the work on the Transformer Installation Guide.

It was noted that a PAR is needed for the Transformer Fire Protection Guide.

E. Insulation Life - Dave Douglas

Mr. Douglas reported on plans for a Seminar sponsored by his Subcommittee, at the next meeting. The Seminar will deal with two EPRI Projects, one on Transformer Overload Characteristics and the second on Mathematic Modeling of Bubble Evolution.

ATTACH. 11-87-B

F. Insulation Fluids - Henry Pearce

Work is underway on the Gas Guide, Transformer Mineral Oil Guide, and the Silicon Fluid Guide.

G. Dry Type Transformers - Roy Uptegraff

Mr. Uptegraff discussed problems dealing with symbology and suggested that an IEEE Guide on this subject may be appropriate. It was suggested that input be obtained from Dave Douglas who had recently encountered this problem.

Mr. Uptegraff also discussed problems concerning certain impedance and winding configurations which result in not meeting the over-voltage requirements while operating at rated temperature rise. It was suggested that the Performance Characteristics Subcommittee be asked to determine if some restraint on the level of impedance would be appropriate.

H. Performance Characteristics - John Borst

Dana Basel represented Mr. Borst at this meeting. It was noted that Mr. Charles Pounds was the new Working Group Chairman on Harmonic Load Rectifier Transformers.

I. Dielectric Tests - Robert E. Lee

Mr. Lee reported that Mr. Harold Moore would assume the Chairmanship of the W. G. on Revision of Dielectric Tests and that Mr. George Vaillancourt would assume the Chairmanship of the Working Group on Partial Discharge Tests.

Mr. Lee presented the results of the Round Table Discussions on Low Side Surge Problems with Distribution Transformers. Mr. Lee moved with an appropriate second that a Task Force be formed with the following Scope: (1) Define the problem of Low Side Surge Failures of Distribution Transformers, (2) Gather and analyze data regarding this matter, and (3) Determine if Standards are required in this area. Should the Task Force confirm that a standard is required, a Working Group can be formed and a PAR issued.

J. Instrument Transformers - Ralph Stetson

Mr. Stetson proposed that Mr. John Davis become the new Chairman of this Subcommittee as he will be retiring from active service. Mr. Davis was appointed as Mr. Stetson's replacement.

K. Awards - Dean Yannucci

Mr. Yannucci will be obtaining several certificates of appreciation for service by certain of our members and making a nomination for the Technical Committee Distinguished Service Award.

Membership

Membership on the Main Transformers Committee was granted to the following individuals:

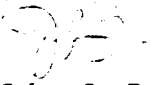
<u>Members</u>	<u>Company</u>	<u>Sponsor</u>
Charles Brown	Florida Power & Light	R. Lee
Wallace Binder	Ohio Edison	J. Borst
Tito Massouda	Ferranti Packard Ltd.	H. Pearce
W. E. Morehart	Westinghouse	H. Pearce
Dennis Johnson	Bonneville Power Assoc.	H. Pearce
David Sundin	RTE	H. Pearce
Tor Orbeck	Dow Corning	H. Perce

New Business

The concept of a Seminar on Legal Guidelines for the Transformers Committee was discussed but it was decided not to pursue this topic.

All Subcommittee Chairmen were requested to review their Scope and send comments to the Chairman. Mr. Veitch will review the overall Scope of the Transformers Committee.

The meeting adjourned at 10:15 P.M.


John J. Bergeron,
Secretary

LP220585ESU

TO : Members of Transformers Committee, Administrative Subcommittee,
November 2, 1987

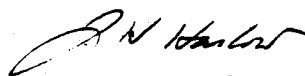
SUBJECT: Status Report - Transformer Standards

Following are topics of interest for the period May 11 - November 2, 1987:

1. Active Transformers Committee Projects. A listing of all project activity by subcommittee included as attachment. Note especially those projects showing no PAR on file; please submit a copy of a PAR if available, or initiate action for a new PAR.
2. The PES liason report is included as attachment.
3. A summary listing of selected transformers topics extracted from "ANSI Standards Action" is included as attachment.
4. Signature Program (Indemnification Program). The IEEE Standards Board has discontinued the program in the form which we implemented it at Ft. Lauderdale. The Standards office has been directed to develop an alternative program which will meet the objective of identifying those persons involved in standards work and advising them of their responsibilities when working on IEEE Standards.
5. There will be an IEEE Standards Conference October 17-21, 1988 in San Francisco. Details are not yet available. Where appropriate, working groups are encouraged to meet at this conference.
6. A new publication the "Standards Bearer" is now in print. The prime purpose: "To promote new standards and encourage openness in the IEEE standardization process."
7. The IEEE Standards Board has approved a revised scope of ASC C57. The revised scope adds "apparatus bushings" previously covered by the now disbanded ASC C76.
8. Andrew G. Salem was named IEEE Staff Director of Standards, replacing Sava Sherr effective June 1, 1987.
9. General note to the membership - with every project authorization request approval, NesCom sends a form letter which includes the bold type statement:

COPIES OF ALL DRAFT STANDARDS DOCUMENTS AND MINUTES
OF ALL MEETINGS ON STANDARDS PROJECTS SHOULD BE
FORWARDED TO THE SECRETARY OF THE IEEE STANDARDS
BOARD.

Is this being accomplished?



J. H. Harlow
Chairman, Standards Subcommittee

Subcommittee: Audible Sound and Vibration
 Subcommittee Chairman: Allan M. Teplitsky (212/460-4859)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMM.	AS OF/STATUS	PES COORD.
P523	PC57.112	A. Teplitsky	Guide for the Control of Transformer Sound	Yes (8/73)	9/17/87 - New draft to follow New Orleans meeting	
	PC57.12.90b		Transformer Sound Power Measurement	Yes (3/86)	9/17/87 - PAR approved 6/19/86	RM

Subcommittee: Bushing
 Subcommittee Chairman: Loren B. Wagenaar (614/223-2259)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMM.	AS OF/STATUS	PES COORD.
P21	PC57.19.00	L. B. Wagenaar	General Requirements and Test Procedures for Outdoor Apparatus Bushings (Rev. of ANSI C76.1)	Yes (4/79)	9/11/87 - D/7 ballot of Trans. Comm. being resolved by subcommittee	SWGR T&D PSR IC
P757	PC57.19.101	F. E. Elliott	Guide for Loading Apparatus Bushings	Yes (5/78)	9/11/87 - IEEE has been requested to publish as a separate guide	PSR SWGR SUB
P800	PC57.19.100	F. E. Elliott	Bushing Application Guide	Yes (4/79)	9/11/87 - Document generated by C76 in limbo until new C57 Bushings Subcommittee is formed. WG working on the application of bushings in contaminated environments and maintenance of bushings.	SWGR SUB PSR

ATTACH. 11-87-B-1
 Sh. 3 of 16

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.
-	-	J. J. Bergeron	WG on Revision of Dielectric Tests	-	-	-
-	PC57.21a	W. N. Kennedy	TF on Revision of Dielectric Tests	Yes (2/86)	5/12/87 - Draft 4 being revised for Subcommittee ballot.	None
-	PC57.12.00j	J. D. Douglass	TF on External Phase to Phase Clearance for Power Transformers	Yes (2/86)	10/26/87 - Reconciling negative ballots on D/4 at WG level	None
-	PC57.98	J. J. Bergeron	TF Revision for Guide for Transformer Impulse Tests	Yes (2/86)	5/12/87 - Discussion re digital techniques and switching test	None
-	-	C. V. Brown	WG for Revision of Dielectric Testing of Distribution Transformers	-	-	-
-	PC57.12.90c	W. R. Henning	TF on Routine Impulse Test for Distribution Transformers	Yes (9/87)	5/12/87 Draft 5 prepared for discussion by WG 9/17/87 - PAR issued	RM PSC
-	-	H. R. Moore	WG on Partial Discharge Tests for Transformers	-	-	-
P545	PC57.113	G. H. Vaillancourt	TF on Guide for Partial Discharged Measurements in Liquid Filled Power Transformers and Shunt Reactors	Yes (4/87)	6/17/87 - Trial use Standard approved by StB	None
?	?	E. Howells	TF on Guide for the Detection of Acoustic Emission From Partial Discharge in Oil-Immersed Power Transformers	No	5/12/87 - Discussing Comments on D/8 10/5/87 - Liason request to SCC. PAR request after 11/6/87	-

11/11/87
 Sh. H. 11-8-1-13-1
 9/30/87

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

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMM.	AS OF/STATUS	PES (COORD.)
	C57.21	R. Dudley	Loading Dry Type Reactors (contribution)	No	5/17/87 - Discussion on D/4	?
P259	None	A. M. Iverson	Standard Test Procedure for Evaluation of Systems of Insulation for Specialty Transformers	No	5/12/87 - D/1 discussion	?
	PC57.12.01	E. Koenig	General Requirements for Dry Type Distribution and Power Transformers	Yes (7/82)	8/5/87 - D/4 distributed to TC for ballot	None
	PC57.96	W. H. Mutschler	Guide for Loading Dry Type Distribution and Power Transformers	Yes (2/81)	5/12/87 - TC negative ballots resolved. Ready to submit to StB.	PSR PSIM
	PC57.124	A. D. Kline	Recommended Practice for Measuring Partial Discharge in Dry-Type Transformers	Yes (1/86)	5/12/87 - Interim review of W.G. ballot on D/3	None
	PC.57.12.60	G. H. Bowers	Standard Test Procedures for Thermal Evaluation of Insulation Systems for Solid Cast and Resin Encapsulated Power and Distribution Transformers	Yes (11/85)	5/12/87 - Unable to fully resolve W.G. and Sub Com ballot	Unclear
P1052	PC57.12.59	R. E. Uptegraff	Dry-Type Transformer Through Fault Current Duration Guide	Yes (84)	5/12/87 - Has been approved by StB. Held pending PC57.96 revision	PSR SWGR
?	?	G. L. Bowers	TC on Flammability and Toxicity	No	5/12/87 - No activity at Ft. Lauderdale	?

ATTACH. 11-87-B-1
Sh 50416

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMI.	AS OF/STATUS	PES COORD.
	PC57.12.58	A. D. Kline	Guide for Conducting Transient Voltage Analysis of a Dry Type Transformer Coil	No	10/12/87 - Returned by StB for endorsement by IAS and IEC	?
	C57.94	R.E. Uptegraff	Recommended Practice for Installation, Application, Operation and Maintenance of Dry-type, General Purpose Distribution and Power Transformers	No	5/13/87 - TC approved reaffirmation 10/2/87 - Reaffirmation request to RevCom	

ATTACH. 11-01-01
 SH 60516

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

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMM.	AS OF/STATUS	PES COORD.
?	?	W. Kennedy	Dielectric Tests for HVDC Transformers and Reactors	No	5/11/87 - First meeting, formerly part of Dielectric Test Subcommittee	?

ATTACH 11-87-B-7
Sh. 70516

Subcommittee: Instrument Transformers
 Subcommittee Chairman: Ralph B. Stetson (603/692-2100)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMM.	AS OF/STATUS	PES COORD.
P546	PC57.13	R. B. Stetson	Standard Requirement for Instrument Transformers	Yes (5/80)	5/12/87 - Negative ballots on D/5 being addressed	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	5/12/87 - Negative ballots on D/6 being compiled	?
P832	PC57.13.4	R. B. Stetson	Detection of Partial Discharge and Measurement of Apparent Charge Within Instrument Transformers	Yes (10/79)	5/12/87 - No activity in Ft. Lauderdale	T&D

MARCH 11-87-B-2
 Sh. 8 of 16

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

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMM.	AS OF/STATUS	PES (COORD.)
	PC57.95	W. E. Wrenn	Guide for Loading Oil-Immersed Step-Voltage and Induction Voltage Regulators	No	9/14/87 - Finished	?
	PC57.91	W. E. Wrenn	Guide for Loading Mineral Oil-Immersed Transformers	Yes (3/85)	5/12/87 - Initial inputs of 4 TF being reviewed.	Sub T&D PSE
	PC57.126	A. C. Wurdack	Standard Test Procedure for Thermal Evaluation of Oil-Immersed Power Transformers Rated Less Than 100MVA	Yes (4/87)	9/10/87 - PAR issued Note: Had been assigned PC57.12.92	NPE
P838	PC57.119	R. L. Grubb	Recommended Procedures for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Rating	Yes (4/80)	5/12/87 - No activity in Ft. Lauderdale	SWGR SUB PSR

ATTACH 11-87-B-1
 SH. 90516

Subcommittee:
 Subcommittee Chairman:

Performance Characteristics
 John D. Borst (314/634-2111)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMM.	AS OF/STATUS	PES COORD.
P638	None	L. R. Stensland	Qualification of Class 1E Transformers for Nuclear Power Generating Stations	Yes	10/16/87 - Results of D/15 ballot being reviewed	NPE SUB
	PC57.18.10	G. C. Bryant	Practices and Requirements for Semiconductor Power Rectifier Transformers	Yes (6/81)	5/12/87 - D/6 being prepared	None
P786	PC57.117	H. F. Light	Guide for Reporting Failure Data for Power Transformers and Shunt Reactors on Electric Utility Power Systems.	Yes (2/79)	8/87 - approved by StB.	T&D NPEC PG
	PC57.21	J. W. McGill	Requirements, Terminology, and Test Code for Shunt Reactors Over 500 kVA	No	10/13/87 - D/5A being balloted in WG	?
P785	PC57.116	B. K. Patel	Guide for Transformers Directly Connected to Generators	Yes (2/79)	5/12/87 - D/9 ballot of TC reviewed	PG PSR RM NPE
P262 E3	PC57.12.90 e3	W. R. Henning	C57.12.90e3 - Revision of C57.12.90 Section 8 - "No Load Losses and Exciting Current"	No	5/12/87 - Discussed ballot results	?

ATTACH. 11-87-B-1
 Sh. 100516

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMM.	AS OF/STATUS	PES COORD.
262 2	PC57.12.90	W. R. Henning	Revision of C57.12.90 Section 8.3.3	No	4/2/87 - D/8 approved by TC 1985. Text held pending C57.12.90e3 project.	?
262 1	PC57.12.90 e1	W. R. Henning	Addition to C57.12.90 Section 8	No	4/2/87 - D/4 text being held pending C57.12.90e3 project.	?
262	PC57.12.90e	W. R. Henning	Revision of C57.12.90 Section 9 - Load Loss and Impedance Tests	No	5/12/87 - Section 9 being rewritten. Earlier draft covered correction of load losses for instrumentation phase angle errors being held for inclusion.	?
1098	PC57.123	W. R. Henning	Guide for Transformer Loss Measurement	Yes (3/85)	4/2/87 - Work awaiting conclusion of C57.12.90e	PSIM
462C	PC57.12.00	W. R. Henning	Supplement for Allowable Loss Tolerances and Methods of Loss Measurements	No		?
	PC57.125	D. J. Cash	Guide for Failure Investigation, Documentation and Analysis for Power Transformers and Shunt Reactors	Yes (2/87)	5/12/87 - D/4 discussed. D/5 to be prepared in August. 6/29/87 - PAR issued	T&D PGS PSE SWGR
	C57.105	-	Guide for Application of Transformer Connections in Three-phase Distribution Systems	None	6/16/87 StB approval for reaffirmation. To C57. BSR comment deadline 10/27/87.	-

ATTACH. 11-87-B-1
Sh. 11 of 16

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

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMM.	AS OF/STATUS	PES COORD.
P799	None	H. A. Pearce	Guide For Handling and Disposal of Transformers Grade Insulating Fluids Containing PCB's	Yes (4/79)	9/25/87 - Published	T&D
	PC57.106	H. A. Pearce	Guides for Acceptance and Maintenance of Insulating Oil in Equipment	Yes (4/86)	5/12/87 - Basis of revisions survey results presented	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)	5/12/87 - Revisions continue	PSR T&D
P954	PC57.121	H. A. Pearce	Guide for Acceptance and Maintenance of Less Flammable Hydrocarbon Fluid in Transformers	Yes (12/81)	8/6/87 - Submitted to RevCom	T&D PSR
	PC57.111	H. A. Pearce	Guide for Acceptance and Maintenance of Silicone Insulating Fluid and Its Maintenance in Transformers	Yes (9/81)	5/17/87 -One TC negative ballot yet to be resolved. 10/5/87 - New liason request to SCC. New PAR request to be after 11/5/87.	None
C57.102		H. A. Pearce	Guide for Acceptance and Maintenance of Transformer Askarel in Equipment	No	9/18/87 - StB approved withdrawal action	

ATTACH. 11-87-13-2
 SH 12 OF 16

Subcommittee: Standards
Subcommittee Chairman: James H. Harlow (601/939-0550)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMM.	AS OF/STATUS	PES COORD.
P801	PC57.15	J. Harlow	Requirements, Terminology and Test Code for Step-Voltage and Induction Voltage Regulators	Yes (6/79)	9/14/87 - Document being edited for printing	SUB SPD

ATTACH. 11-87-B-1
SL130916

Subcommittee: West Coast
 Subcommittee Chairman: Dennis Gerlach (Telephone # ?)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS. COMM.	AS OF/STATUS	FES COORD.
P513	PC57.114	S. Oklu	Seismic Guide for Power Transformers and Reactors	Yes (7/73)	3/30/87 - Comments to D/15 complied and incorporated into D/16. W.G. to meet July 1987.	NPE Sub
P842	PC57.120	R. Jacobsen	Loss Evaluation Guide for Power Transformers and Reactors	Yes (5/80)	10/12/87 - D/14 sent for Transformers Committee ballot.	Sub RM PG
	PC57.93	D. Johnson	Guide for Installation of Liquid Immersed Power Transformers (Including C57.12.11 and C57.12.12 Consolidation)	Yes (6/82)	3/30/87 - W.G. did not meet at last subcommittee meeting	None
		H. Johnson	Fire Protection of Outdoor Liquid Immersed Power Transformers	No	3/30/87 - Project in research phase, not yet a formal project.	

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 SHEET 14 OF 16

IEEE TRANSFORMERS COMMITTEE
PES LIASON REPORT

Composite Listing of Active Liason
with other IEEE PES Technical Committees
Initiated 1985 through November 2, 1987

<u>Year Instituted</u>	<u>TC</u>	<u>Project Title</u>	<u>Trans Comm Liason</u>
1985	SPD	Distribution Arrestor Durability and Protective Characteristics	C. J. McMillen
1986	SUB	Guide for Customer and Interactive Power Systems (Cogeneration)	J. D. Borst
1986	SPD	Requirements, Terminology and Testing Procedures for Neutral Grounding Devices	*W. H. Mutschler
1986	SPD	Guide for the Application of Metal Oxide Surge Arrestors for Alternating Current Systems	*R. E. Lee
1986	SPD	Guide for the Application of Gapped Silicon Carbide Surge Arrestors for Alternating Current Systems	O. R. Compton
1986	PSR	Digital Protective Relay System Interface Std.	O. R. Compton
1986	NPE	Criteria for Independence of Class 1E Equipment and Circuits	O. R. Compton
1986	T&D	Guide for Anaysis and Definition of DC Side Harmonic Performance of HVDC Transmission Systems	*W. N. Kennedy
1987	SUB	Recommended Practice for Determination of Power Losses in HVDC Converter Stations	W. N. Kennedy
?	PSR	Guide for Protection of Network Transformers	D. R. Smith
?	SUB	Design Guide for User-Owned Substations	J. J. Bergeron
1987	PG	*Dynamic Performance of Excitation Control Systems	B. K. Patel
1987	SUB	*Systems Used for Supervisory Control, Data Acquisition and Automatic Control	J. H. Harlow
1987	PSR	*Protective Relay Application to Power System Buses	G. Gunnels
1987	DEI Soc.	*Guide to the Statistical Analysis of Thermal Life Test Data	D. H. Douglas

*New or Revised from May 11, 1987 report

Listing of Liason Invitations of Other TC Declined
May 11, 1987 - November 2, 1987

<u>TC</u>	<u>Project Title</u>
PG	Recommended Practice for Integrating Power Plant Computer Aided Engineering Applications
SUB	Guide for Substation Fire Protection

SUMMARY OF SELECTED TRANSFORMERS TOPICS FROM
"ANSI STANDARDS ACTION"

April 24, 1987 - October 9, 1987.

Final Actions:

ANSI/IEEE C57.12.00 - 1987	Approved March 20, 1987
ANSI/IEEE C57.12.90 - 1987	Approved March 18, 1987
ANSI C57.12.10 - 1987 (Consolidation and revision of ANSI C57.12.10-1977; C57.12.10a-1978; and C57.12.30-1977)	Approved June 4, 1987
ANSI/IEEE C57.13 - 1978 (R1987)	Reaffirmed August 21, 1987
ANSI/IEEE C57.110 - 1987	Approved August 21, 1987
ANSI/IEEE C57.117 - 1987	Approved August 21, 1987
ANSI/IEEE C57.13.1 - 1981 (R1987)	Reaffirmed August 25, 1987

Newly Published:

ANSI C57.12.26 - 1987
ANSI C57.12.55 - 1987
ANSI C57.12.57 - 1987
ANSI/IEEE C57.12.56 - 1986
IEC 76-3-1:1987 Power Transformers - Part 3

Proposed Withdrawal: (To be withdrawn 12/31/87 unless R, R or W, partial listing)

ANSI C57.12.10 - 1977
ANSI C57.12.30 - 1977
ANSI C57.16 - 1958
ANSI/IEEE C57.106 - 1977
ANSI/IEEE 21 - 1976

Note: ANSI C57.99 - 1965 (IEEE 731) was also discussed at Ft. Lauderdale and apparently belongs on this list.

REPORT OF CHAIRMAN
TO
IEEE TRANSFORMERS COMMITTEE

1987 FALL MEETING

This continues to be an exciting, challenging, and time consuming responsibility. There is, however, too little feedback and any chairman must constantly wonder if his efforts meet the needs of the Committee members. So, don't hesitate to mention the ways I can serve the Committee better.

At the 1987 SPM I attended a number of meetings in the discharge of my duties. In addition I attended the transformer technical sessions. I applaud our session chairmen for a job well done and express the appreciation of the committee to the authors.

The high point of the SPM for me was the announcement that due to the "excellent job of providing the Standards Board with paper at our Fort Lauderdale meeting", there will be no need to continue the attendance/affirmation process. So, now, we can get back to standards-making. I understand that we tied up all the PCs in the standards office for several days before the decision was made.

There will be VCRs available at the Winter Power Meeting for use in Technical Sessions and for Committee Meetings on an experimental basis. In addition there is activity toward the return of overhead projectors -- if the quality of the overhead slides can be assured. More work must be done on this.

With the advent of each new secretary, there is always a flurry of up-dating of membership records. This is very necessary because our standards voting procedure requires an up-to-date listing of eligible voters. If by chance, a member cannot attend the requisite number of meetings and a representative is appointed, that representative should sign in at the Committee meeting as a representative.

We need to make a concerted effort to review and, if necessary, revise our scopes. Each Sub-Committee should appoint a task force to handle this effort by correspondence. The Sub-Committee chairmen will serve as a task force to review the Committee's scope. When the review is completed, the scopes will be submitted to the Technical Council for approval and ratification. I hope that we can complete and vote upon our scopes at the Spring Meeting. They could then be submitted to TC for consideration at the 1988 SPM Meeting.

At the same time, we need to make a sincere effort to update our rosters of members. I would like to believe that every person on our various membership lists has confirmed his desire to remain on the list in 1988. In addition, we need to also up-date our Invitational List in the same fashion. Every member is requested to review the invitational lists and suggest changes concerning persons they may know on the list who are no longer active in transformer concerns. In a like manner, we should add, provisionally, the names of other persons to whom an invitation should be sent for the Spring Meeting.

Your officers need guidance on the subject matter of papers to be presented at our technical sessions. It is always possible to develop single issue sessions with invited papers. If this is of interest, please discuss with Bob Veitch, our Technical Sessions Coordinator and Associate Editor of the Transactions.

Invitation to Membership on the Committee comes upon the recommendation of our Sub-Committee Chairmen and the concurrence of the Executive Sub-Committee. If you are interested in Committee membership and have shown the requisite effort and attendance, it is perfectly proper to make your desire known to an appropriate Sub-Committee Chairman.

The operation of the Technical Committees of IEEE is the responsibility of the Technical Council (TC). Membership on the TC includes the Technical Committee Chairmen and certain TC Committee Chairmen. If there is any matter or suggestion you wish the TC to consider, please let me know.

There is a proposal being studied to authorize each Committee to select an Outstanding Working Group annually and award an appropriate certificate.

Additional study is being made on the concept of highly practical papers for presentation at PES meetings. These would be similar to the "Special Paper" Session sponsored by the T&D Committee at the T&D Conference.

Finally, I want to express my appreciation to every member of the Committee, the Sub-Committees, Working Groups, etc. for your voluntary contributions. I especially thank the various officers for your contributions. Your excellent efforts make the Chairman look real good.

Respectfully submitted,



Olin Compton, Chairman
IEEE/PES Transformers Committee

1987 SUMMER POWER MEETING REPORT
IEEE/POWER ENGINEERING SOCIETY
TRANSFORMERS COMMITTEE

JULY, 1987

MEMBERSHIP

The Committee's membership remains stable. While the older members are retiring and resigning earlier, we are seeing a good influx of young members. Eight new members were appointed at the Committee's Spring Meeting.

It appears, coincidentally, that the user and consultant membership group is increasing.

A concerted effort is underway to reconfirm addresses, subcommittee assignments, etc. of not only the Committee members; but, also, the total listed membership of all the ancillary groups. This covers over 325 individuals.

MEETINGS

The 1987 Spring Committee, Subcommittees, and Working Groups Meetings were held in Fort Lauderdale, Fl. on May 10-13, 1987 with additional meetings on May 9 and 14. We had the largest attendance to date at these meetings. There were 182 engineers and well over 50 "accompanying persons" registered. Due to fortunate inclement weather conditions, the Monday-Wednesday technical sessions had record attendance.

The Fall Meetings will be held in New Orleans on November 1-4, 1987. Other future meetings include Washington, DC, April 10-13, 1988; Long Beach, CA, November 6-9, 1988; Chicago, IL, Spring, 1989; Charlotte, NC, Fall, 1989; Denver, CO, Spring, 1990; and Montreal, Que., Fall, 1990.

OFFICERS

All offices are currently filled with vigorous, capable and active individuals.

STANDARDS ACTIVITY

At the Spring Meeting, with adequate prior notice, all attenders were required to be in full compliance with current Standards Board, Board of Directors, and By-laws requirements concerning our part in the accredited standards agency setup. We wonder, however, at the cost the IEEE staff must incur to follow all of our individual certifications. It was suggested that perhaps the chairman or secretary

of each task force, working group, subcommittee, or committee could perhaps make a blanket certification to IEEE that all persons attending (acting?) at a specific meeting complied with the relevant policies.

COMMITTEE PROCEDURES MANUALS

A manual for Meetings Hosts has been prepared by one of our previous meetings hosts, reviewed by several other previous hosts and distributed. This manual, which covers previous practices and committee policies, is given to prospective meetings hosts for their use in making arrangements with hotels, book-keeping, reporting, etc.

We have almost completed a review of our Committee Operations and Policy manual. It should be available for distribution in a few months.

TECHNICAL PAPER SESSIONS PLANNED FOR SUMMER MEETING

Two four-paper technical sessions are planned for the 1987 Summer Power Meeting. A total of 15 papers were reviewed.

GENERAL

The Committee is compiling their goals and long range plans, etc. so that a final presentation can be made in the Fall, 1987 Meeting.

We are undertaking a complete review of Committee policy, meeting schedules, scopes, etc. over the next 12 months so we may enter the 1990s in good order.

Respectfully Submitted,



Olin R. Compton, Chairman
IEEE/PES Transformers Committee



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Report on Technical Paper Activities

(A) 1988 Winter Power Meeting (WPM)

Having just completed the technical paper reviews for the 1988 Winter Power Meeting, I thought it would be a good time to prepare my report on Technical Paper Activities. As part of this report, I wanted to review with the members of the Transformers Committee, the complete procedure required for reviewing technical papers and establishing the program for the Winter Power Meeting. I am sure that many of our newer members may wonder how this comes about.

The deadline for submitting papers for the 1988 Winter Power meeting was September 1, 1987. Headquarters is rightfully very sticky about meeting this date and will not accept any paper which fails to meet the required deadline without the approval of the Technical Publications Co-ordinator. As a result, those authors who miss the September 1st deadline, are referred to the Technical Publications Co-ordinator for "special consideration". If the deadline has not been missed by more than a few days, and the paper appears to have real interest for our members, I will usually accept the paper for review provided the author sends 5 copies directly to me by courier as well as proceeding through "normal" channels. The short-circuit is required to ensure that the papers are sent out for review at the earliest possible date.

In the process of reviewing papers, time is of the essence. We have deadlines to meet all the way down the line as the program must be established, advanced programs printed, final programs printed, etc., and the meeting dates are cast in concrete. This year, the date to have all reviews and recommendations completed and at headquarters was October 22, 1987. Based on this date, I set October 15 as the deadline for receipt of reviews. The required date was typed at the top left hand corner of each yellow RF-2 review form sent out. A typical review form is attached to this report.

This year I received 16 papers during the latter part of August and the first two weeks of September. Each paper, along with review Form RF-2, must be sent to 4 individuals for review. The selection of reviewers is most important. Even though I have known many of our members for years, the membership is in a continuous state of flux, therefore, I cannot know the technical capabilities of everyone. To assist me in selecting reviewers, I asked each Subcommittee Chairman to prepare a list of names of potential qualified reviewers within their subcommittee, indicating their specific areas of expertise. The response to this request was very good and I thank all those Chairmen of Subcommittees and Working Groups who responded to my request. In past years, I felt that the burden of reviewing technical papers fell on too few members of our committee. I personally have received as many as 5 papers for a specific meeting.

This year, to more evenly spread the review load, I decided that no member would receive more than two papers for review. As a result, 64 copies of papers and Review Form RF-2 were sent to 47 members selected from the lists sent to me by the Subcommittee & Working Group Chairmen.

It is therefore possible that this is the first time that some of our members have been called upon to review a paper. The results have generally been very satisfactory. However, based on the returns which I received, I would like to make some recommendations to each and every member who is asked to discharge his responsibility by reviewing technical papers.

1. Read the RF-2 Form completely.
2. Complete the form as required. The following omissions were noted on returned forms:
 - Reviewer's signature and date.
 - Analysis of the paper's contribution. Only a "✓" is required.
 - Grading.
3. Prepare a statement of 100 words or more to support the grading. This part of the review is most important especially if the paper is rejected. It is not acceptable to reject a paper without valid reasons for doing so.
4. If you receive a paper for review and you do not feel that its subject is within your area of expertise, please return it to the sender immediately. It is then up to the Technical Publications Co-ordinator to select another member who will be asked to review the paper. I have actually had papers returned to me unreviewed, after the deadline for receipt of the review. This is unfair to everyone.
5. If you do not feel competent to review a paper sent to you, is there someone else in your organization who could do a competent review for you? Feel free to select the best qualified individual to do this work (assuming he is willing to volunteer his time).
6. Complete your reviews and supporting statement and return them in sufficient time that the Technical Publications Co-ordinator will receive them by the required deadline. The deadline for receipt of reviews this year was October 15. Many reviewers thought it was acceptable to post their reviews by October 15. This is not so. On all future requests for reviews, I plan to include my FAX number. This is a wonderful device which provides instantaneous mail service and is not subject to the vagaries of the post office. If FAX is used you can complete your review on the required date and I will receive it on the required date, so we'll both be happy.

Once all the reviews are received, I must review them before a final decision is made on each paper. As you can imagine, when 4 different individuals review a paper, the reviews and recommendations can vary widely. It is very easy for me when all reviewers grade a paper A (accept) or RJO (reject outright). However, when some reviewers think the paper is great and others have the opposite opinion, it is necessary to carefully consider the reviewers comments and possibly review the paper myself before making a final decision. Meeting the requirements of the PES Publication Guide is most important.

Once the papers have been selected, it is then necessary to inform IEEE Headquarters of the papers to be presented in each session of the Winter Power Meeting. Some papers are accepted on the basis of "mandatory" changes being made to them. These papers must be returned to their authors by IEEE Headquarters in sufficient time to allow the changes to be made and the modified paper to be reviewed again. It is the responsibility of the Technical Publications Co-ordinator to review all papers which have been modified and to formally approve them in sufficient time to allow them to be printed well in advance of the meeting.

For the 1988 Winter Power Meeting, 16 papers were submitted for review. These papers were graded as follows:

Accept without change	-	5
Accept with mandatory changes	-	3
Rejected outright (RJO)	-	6
Rejected for revision and re-review (RJR)	-	2

There will be 2 - 4 paper sessions on February 2, 1988. I hope as many Transformers Committee members as possible will be able to attend those sessions.

Of the 8 papers being presented at the 1988 Winter Power Meeting, 3 were co-authored by members of the Transformers Committee. These are:

- (a) Fault Current Capability of Distribution Transformers with Under Oil Arresters by W.R. Henning, A.D. Hernandez, W.W. Lien.
- (b) A Refined Mathematical Model for Prediction of Bubble Evolution in Transformers by W.A. Fessler, T.O. Rouse, W.J. McNutt, O.R. Compton.
- (c) Digital Acquisition & Processing of Partial Discharges During Acceptance Test of HV Transformers by G. Vaillancourt, R. Malewski.

(B) 1987 Summer Power Meeting (SPM)

The SPM was held in San Francisco in July. The Transformers Committee sponsored two sessions on Thursday, July 16. A total of 7 papers were delivered. Both sessions were well attended.

(C) Meeting of The Technical Council AdHoc Publications Committee

The Committee met July 13, 1987 in San Francisco during the SPM. The following was concluded.

1. The Technical paper target numbers were distributed based upon the average of the last five years.

2. The questions of an extension of time for foreign discussions was reviewed. It had been suggested that the cutoff date for receipt of discussions, submitted by foreign discussers, be based on the post mark date instead of the date received at Headquarters. The committee overwhelmingly favored no additional extension. It was agreed that an IEEE FAX number and encouragement to use "Courier-Mail" should be added to the Publications Guide to ensure that discussions are received by the required date.
3. Publications Guide will be changed to show 18 characters per inch limit (instead of 16) if proportional spacing is used. This is compatible with previous printed discussion and closures.
4. The consensus regarding "Closure" treatment was that a form should be transmitted to the Author at the time a request for Closure is sent. The form will allow the Author either (1) to provide a closure, (2) to authorize the paper to be printed without a closure or (3) to withdraw the paper.

If no response is obtained within three weeks (five weeks overseas) the paper will be evaluated by the Technical Publications Co-ordinator for dispensation. If the paper is published it will be stated that no closure was provided.

5. It was unanimously agreed that a Conference Record would be highly desirable for the T&D Conference. A proposal for the method of handling papers will be prepared by Vern Chartier and Don Nickel of the T&D Committee. This procedure should be approved by the Technical Council.



R.A. Veitch
Vice-Chairman Transformers Committee/
Technical Publications Co-ordinator

November 12, 1987

RAV:cs

Att.



IEEE Power Engineering Society

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Oct. 15/87 IS DEADLINE DATE FOR RECEIPT OF THE REVIEWS TO:

Reply Address:

FAX (416) 674-8776

R.A. Veitch
NEI Ferranti-Packard Transformers Ltd.
10 Carlson Court
Rexdale (Toronto), Ontario, Canada

Dear John

Date Sent: Sept. 1/87

The Power Engineering Society would be grateful for your assistance in reviewing the attached paper. Please review the paper carefully and promptly and fill out all parts of this sheet. You are assisting the Technical Paper Coordinator who is acting as an editor to determine whether the paper should be accepted or rejected by the Power Engineering Society. There is an obligation both to the author and the Society to provide papers of high professional quality to the technical sessions and for permanent reference value.

IF FOR ANY REASON YOU CANNOT MAKE THIS REVIEW BY THE ABOVE DEADLINE, PLEASE INFORM ME IMMEDIATELY, AND RETURN THE PAPER AND FORMS TO ME.

To help me to make the final evaluation of the paper and to give the author the basis of the decision, IT IS REQUIRED THAT YOU PREPARE A STATEMENT OF 100 WORDS OR MORE TO SUPPORT OR CLARIFY YOUR GRADING. INCLUDE IN THIS STATEMENT ANY SUGGESTIONS AND IDENTIFY CLEARLY THE SPECIFIC CHANGES REQUIRED FOR THE ACCEPTANCE OF THE PAPER. It is most important that you remain anonymous to the authors so your statement should be typed on plain unsigned sheets. Your recommendation should not be included in your review statement.

A copy of your comments will be passed to the authors, so please write with all courtesy and tact. Comments should be concise and objective, should focus on technical correctness and clarity, and should not form a discussion.

Thank you for your cooperation in this vital IEEE work. I COUNT ON YOU TO RETURN THIS FORM TO ME, WITH BOTH SIDES COMPLETED, BY THE ABOVE DEADLINE.

Sincerely,

SPECIAL COMMENTS FROM REVIEW ON REVERSE SIDE

Paper should be considered for Prize or Award _____

Paper should be considered for Spectrum _____

Paper should be considered for The Review _____

Paper should be brought to the attention of the PES Public Affairs Council _____

Paper should be referred - to a different reviewer _____

- to a different Committee _____

Reviewer's Signature _____ Date _____

SAMPLE

Paper Title: _____

Reference # _____

SCORING

For each of the following qualities, please give your judgment of this paper by circling the most appropriate figure. A paper does not have to score well in all qualities to be accepted: for example, a concise and critical summary of work in a certain field may have no originality, yet may be a valuable publication. Strike out any line which you feel is not applicable to this paper.

Please Note: Overt commercialism is criteria for rejection. Also prior publication, as defined in the PES Publication Guide, may preclude acceptance of a paper. Please refer to the Guide for complete details.

Legibility of paper and figures	5 4 3 2 1 0	Unreadable in places
Original, ingenious	5 4 3 2 1 0	Restatement of existing knowledge
Advancement of state-of-the-art, significant	5 4 3 2 1 0	Insignificant
Valuable to engineering science	5 4 3 2 1 0	Inconsequential
Valuable to industry	5 4 3 2 1 0	Impractical; commercial propaganda
Technically sound	5 4 3 2 1 0	Unsound
Mathematically sound	5 4 3 2 1 0	Unsound, obscure
Well supported by experimental evidence or operating experience	5 4 3 2 1 0	Unproven
Treatment of subject thorough, complete	5 4 3 2 1 0	Incomplete
Rich in engineering judgment and knowledge of field	5 4 3 2 1 0	Amateurish
Clear, concise, and effective in presentation	5 4 3 2 1 0	Obscure, verbose, repetitive, unorganized
References to prior work, complete	5 4 3 2 1 0	Inadequate
Meets requirements of PES Publication Guide, satisfactory	5 4 3 2 1 0	Unsatisfactory
Other qualities noted (Please specify)		

ANALYSIS

The paper contributes to the technical knowledge in one or more of the following examples in that it (check one or more):

- Presents fundamental or advanced concepts.
- Describes new apparatus or system application backed by test data and field experience.
- Describes proven valuable innovation.
- Describes a useful new technique of measurement, calculation, or design, together with practical examples.
- Presents a needed commentary and summary of technical knowledge not previously arranged for convenient reference.
- Presents useful data and experience which is of current and timely interest that reflects changes that should be made in a new changing technology.
- Proposes an Institute Standard.
- Other examples not listed (specify).

GRADING (Support with statement of 100 words or more)

It is recommended that the paper be (check one):

- Accepted without change.
- Accepted with suggested but not mandatory changes
- Accepted subject to mandatory changes (REQUIRED CHANGES MUST BE CLEARLY STATED).
- RJR - The subject matter of this paper merits inclusion in PES Publications but the composition and/or text does not meet Institute standards. Revised manuscript will be returned to you (the reviewer) for a repeat evaluation under PES review procedure. (REQUIRED REVISION MUST BE DESCRIBED.)
- RJO - The subject matter of this paper does not merit inclusion in PES Publications. Revision will not be considered. (EXPLANATION MUST BE PROVIDED.)

ATTACH.
11-87-OC
p 1. of 3

21302

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DEC 17 1987

John J. Bergeron
Secretary
IEEE Transformers Committee

Dear John:

The activities report for the Audible Sound and Vibration Subcommittee is as follows:

PC57.112 Guide for the Control of Transformer Sound. An ESEERCO project done by Westinghouse and Bolt Beranek & Newman produced a transformer sound control manual. Investigation is now underway to determine if that manual together with an update on more recent technology will suffice. This will be reported on at the Spring 1988 meeting.

PC57.12.90b Transformer Sound Power Measurement. A new draft of proposed standard changes and additions is being prepared by subcommittee review and hopefully will be balloted within the subcommittee by the Spring 1988 meeting.

Sincerely,

A handwritten signature in cursive script that reads "Lennart A. Swenson".

Lennart A. Swenson, Secretary
Audible Sound & Vibration Subcommittee

MEETING MINUTES

Audible Sound and Vibration Subcommittee
New Orleans, Louisiana
November 3, 1987

The Subcommittee was convened by Allan Teplitzky at 10:10 a.m., November 3, 1987.

The following were present:

Members

R.S. Girgis
W.H. McNutt
L.M. Nicholas
H.J. Sim
L.A. Swenson
A.M. Teplitzky

Guests

K. Carrander
A. Delgado
J. Frank
R. Garcia
R.R. Hayes
J.W. Hupp
R. Jacobsen
W. Patterson
L.W. Pierce
V.Q. Pham
R.N. Rahangdale
B. Ram
W.W. Stein

1. Minutes of the May 12, 1987, meeting in Ft. Lauderdale were reviewed and approved.
2. The seminar to be presented in the afternoon was discussed. The format was revised to the following:
 - a. Allan Teplitzky will introduce the seminar and discuss its objectives.
 - b. Bill McNutt will discuss NEMA TRL history and its applications.
 - c. Ramsis Girgis will discuss frequency analysis.
 - d. Allan Teplitzky will discuss sound power vs. sound pressure.
 - e. Kjell Carrander will discuss the European standards.
 - f. The panel members will discuss audience questions.

The goal of the seminar is to gain direction from the Transformers Committee.

Ramsis Girgis questioned the goal of our efforts, whether it was to require both sound power and 1/3-octave band measurements. He also questioned inclusion of derivation of A-weighted sound level from 1/3 octave band measurements when the A-weighted sound level is easily measured.

Page 2

Bill McNutt suggested we clearly define proposed changes.

Two PAR's are presently assigned to the AS&V Subcommittee. One is revision of the measurement of transformer sound level. The other is a guide for controlling transformer sound, on which work has not begun. An ESEERCO project done by Westinghouse and Bolt Beranek & Newman, Inc., produced a transformer sound control manual. Allan Teplitzky will check on possible use of that manual and Ramsis Girgis will report later on other developments since the ESEERCO manual was published.

Ramsis suggested distribution of a summary of proposed changes for comment prior to another draft of the transformer sound level measurement standard.

The meeting adjourned at 11:10.

Lennart A. Swenson
Secretary, Audible Sound and Vibration Subcommittee

(ENT-2167h)

BUSHING SUBCOMMITTEE

Report to the Transformers Committee
November 4, 1987

The Bushing Subcommittee met on Tuesday, November 3, 1987 with eleven members and nine guests present. Lloyd Miller of Central Moloney and Devki Sharma of Nova Scotia Power are new members of the Subcommittee. Dennis Bowman of Westinghouse will change his job position in the near future and he will be replaced as secretary of the Subcommittee by Prit Singh, also of Westinghouse. The current membership of the Subcommittee is 24.

It was reported that P757, Guide for Loading Power Apparatus Bushings, has hit another snag at IEEE Headquarters. There was apparently some confusion which led the IEEE to believe that P757 was to be held up until P800, Bushing Application Guide, had been approved. Fred Huber thinks that P757 is once again on track for publication as a Trial Use Guide.

The report on the activities of the Working Group on the Bushing Application Guide was given by Chairman Fred Elliott. The Working Group met on Tuesday morning with eight members and 12 guests present. The Working Group discussed the Application of bushings in contaminated environments and maintenance of bushings. Preliminary drafts of both topics were reviewed at the meeting. Discussion on contamination centered around counter-measures for contamination, and in particular, the use of extra creep distance bushings. Further efforts in this area will include a comparison of practices of different utilities, as well as IEC and Japanese recommendations, for different levels of contamination. Discussion on maintenance centered on periodic power factor and capacitance measurements. Stan Osborn of Doble Engineering will submit the Doble user companies' bushing guide to the Working Group for use as a reference for this item.

The Bushing Subcommittee discussed a variety of other subjects: Work continued on the review and resolution of the numerous comments on the Draft 7 ballot of P21, General Requirements and Test Procedure for Outdoor Apparatus Bushings. One of the more significant changes is a warning to the transformer designer that the proximity effect of ground planes such as installation adapters and tank walls are unusual conditions in the sense that bushings are tested while mounted on flat mounting planes. This warning is included as a result of the extensive use throughout the industry of bushing turrets on EHV transformers.

A Working Group on Bushings for HVDC Applications has been established within the Bushing Subcommittee. Once a Chairman has been found, the Working Group will work with the Subcommittee on HVDC Converter Transformers and Smoothing Reactors to study the

special problems associated with dc bushings, to determine what standards need to be established and to write said standards.

A Task Force on Bushings for Distribution Transformers has also been established within the Bushing Subcommittee. Lloyd Miller will chair this task force. The scope of the task force will be to determine if there is a need for standardization of this type of bushing, and if so, to identify the specific areas which should be standardized, e.g., performance and testing. If the task force determines that such standards are required, then the scope of the Bushing Subcommittee must be enlarged to include distribution transformer bushings. If anyone is concerned about these bushings, please contact Lloyd Miller.

Under new business, the Subcommittee took under advisement the subject of bushings exposed to accidental operation^{of} fire protection deluge systems. Egon Koenig of Detroit Edison Co. brought this subject to the attention of the Subcommittee because of several recent flashovers of 345kV bushings during the accidental operation of deluge systems. The Subcommittee will investigate this subject further by asking Mr. Koenig for technical details of these events and by searching for other such events in the industry.

L.B. Wagenaar
Chairman

LBW/vlh

Minutes of the November 2, 1987 New Orleans Meeting
HVDC Stressed Converter Transformers and
Smoothing Reactor Subcommittee

Members Present

D. J. Allan	GEC Power Transformers
K. Carrander	ASEA
K. R. Highton	Consultant
C. Hurty	Bechtel
L. Jump	Federal Pioneer
W. N. Kennedy	Westinghouse Electric Corporation
S. Oklu	Los Angeles Department of Water & Power
W. W. Stein	Transformatoren Union
G. Vaillancourt	IREQ

Members Absent

H. G. Fischer	EHV Weidmann
J. Gerth	Brown Boveri
D. G. Gillies	Consultant
E. T. Norton	Consultant
E. Yasuda	Bonneville Power Administration

Guests Present

A. Forrest	Teshmont Consultants
H. R. Moore	Westinghouse Electric Corporation
V. Q. Pham	ASEA
T. Prevost	EHV Weidmann
B. Ram	Federal Pioneer
P. Singh	Westinghouse Electric Corporation

The meeting was called to order at 8:00 a.m. with nine members and six guests present. The meeting began with a review of the recent CIGRE Joint Working Group SC12/14.10 on HVDC Converter Transformers. This CIGRE group was formed to evaluate present hvdc test procedures in the light of field performance and present recommendations to I.E.C. for converter transformer standards. At the CIGRE meeting, dielectric testing received considerable discussion, particularly the subject of individual ac and dc tests versus a combined test. Reviews of the existing literature tended to support the validity of individual tests for fairly uniform insulation structures such as main gaps. Additional work will be performed to investigate fields in more divergent locations such as bushings and leads. The CIGRE Working Group is also examining field performance of converter equipment. So far, most problems that have been discussed are not related to dc applications, but are difficulties that could have occurred in conventional designs.

Minutes of the November 2, 1987 New Orleans Meeting
HVDC Stressed Converter Transformers and
Smoothing Reactor Subcommittee
Page 2

At present there are two recommended values for both polarity reversal and one hour dc tests in the literature -- one set of values was presented in a CIGRE paper in 1977, while the other set was published in an IEEE Transactions paper in 1986. In general, the polarity reversal test level recommended by IEEE is greater than the CIGRE value, while the CIGRE one hour test level is higher than the IEEE value. One task for our IEEE Subcommittee was to gather information on the dc systems in operation and compare their actual tests levels with those recommended by IEEE and CIGRE. This has been done and the results were distributed to our members at our meeting. Briefly, this survey indicates that polarity reversal levels used in many transformer designs were already higher than CIGRE recommended levels and were very close to the IEEE values. Only one system used one hour tests similar to the IEEE voltage level; the remainder were calculated using the CIGRE formulas. This study would indicate that a combination of IEEE polarity reversal and CIGRE one hour DC test voltages would provide an acceptable proof test for converter equipment.

The remainder of the meeting was devoted to a presentation by Dr. Ram from Federal Pioneer on the calculation of harmonic losses for converter transformers. Dr. Ram began with an overview of the paper "Effect of Harmonics on Converter Transformer Load Losses" by B. Ram, A. Forrest and G. Scoiff, presented at the 1987 Winter Power Meeting in New Orleans. In this paper, the authors present a technique for dividing up the stray losses into separate winding and non-winding losses. Losses of the transformer are measured at different frequencies on the actual transformers and ratios of effective resistance are calculated for the n^{th} harmonic to the 60 Hertz value. Two exponents are then derived - one for winding loss and one for the remaining losses. In their IEEE paper the authors achieved very good agreement for a three-phase five leg core converter transformer. Dr. Ram presented additional data at the meeting on a single-phase four limb design with similar favorable results. We will distribute copies of the paper along with descriptions of the test equipment with the minutes of the meeting. Other manufacturers are encouraged to perform similar measurements on converter transformers when possible. Should the winding and tank exponents remain fairly constant, it is very likely that this technique would prove most worthwhile in the evaluation of transformer performance during the bid stage and also during test. This provides an excellent opportunity for the Transformers Committee to make a significant contribution to HVDC technology.

The meeting was adjourned at 9:30 a.m.

Respectfully submitted,



William N. Kennedy
Chairman, HVDC Stressed Converter
Transformer and Smoothing
Reactor Subcommittee

WNK/bvs

016/WNK

MEETING MINUTES

DIELECTRIC TESTS SUBCOMMITTEE

November 3, 1987

The Monteleone - New Orleans, LA1. INTRODUCTION/ATTENDANCE

The Dielectric Tests Subcommittee met at 1:50 P.M. with 38 members and 59 guests in attendance. Bill Carter and Ramon Garcia have been accepted as new members of the Dielectric Tests Subcommittee.

2. APPROVAL OF MINUTES

The minutes of the May 12, 1987 meeting in Fort Lauderdale, FL were approved as submitted.

3. CHAIRMAN'S COMMENTS

Dates and locations of future meetings were announced.

4/10 - 4/3/88	Washington, D.C.
11/6 - 9/88	Long Beach, CA
4/2 - 5/89	Chicago, IL
Fall 1989	Charlotte, NC
3/18 - 21/90	Denver, CO
Fall 1990	Montreal, Quebec, Canada

Mr. C. V. Brown has been accepted to full committee membership by the Administrative Subcommittee.

4. WORKING GROUP REPORTSA. Working Group on Revision of Dielectric Tests

John Bergeron

The Working Group met on November 2, 1987 at 3:05 P.M. with 13 members and 19 guests present.

The minutes of the May 11, 1987 meeting were approved as mailed.

Task Force on Revision of Dielectric Tests
of Shunt Reactors

W. N. Kennedy

The Task Force met earlier in the day with 8 members and 15 guests present. They continued discussion of Draft No. 5A of their document which is a section of the Shunt Reactor Test Code which is also being prepared. They reviewed several editorial changes as well as changes concerning the 7200 cycle test involving the neutral of oil filled shunt

reactors, which is a somewhat obsolete reference. Changes will be made to Table 5 regarding this. In the wording for the dielectric tests themselves, the new one hour, three phase test was replaced with three - one hour, single phase tests. However, the adequacy of phase-to-phase insulation can not be demonstrated in the shunt reactor so - it is recommended that the manufacturer demonstrate the adequacy of the phase-to-phase insulation through the achievement of a 1.5 line to neutral test voltage between the line terminals during the one hour test. In addition, a requirement will be added to insure that the neutral meets BIL and low frequency test levels. Also, wording requiring grounding of all untested terminals, the tank, and the core to be grounded, will be added. Waveshapes during impulse testing of low impulse reactor windings were discussed and the burden to achieve good waveshapes was placed on the manufacturer. Mr. Dudley has prepared a summary from IEC Standards on Waveshape Control. There will be a simultaneous ballot of the Working Group and Subcommittee on this document.

Task Force on External Phase to Phase Clearances
for Power Transformers

Jim Douglass

Bob Veitch conducted the meeting since Mr. Douglass could not be present. The Task Force met with 4 members and 12 guests present.

The meeting was devoted entirely to a review of the balloting of the Working Group on Project PC 57.12.00j/D6. Ballot results were:

31	Approved
3	Approved with comment
5	Not approved
1	Not voting.

The following is the resolution of the negative ballots and comments:

- 1) The document will be placed in C 57.12.00, Section 6.
- 2) The inclusion of 92 kV as a nominal voltage will be reviewed and will be dropped if it is not in C 84.
- 3) Reference to "Windings" will be dropped due to the internal connotation.
- 4) A request that clearances be increased to allow for birds or animals was denied. A footnote will be added regarding this problem.

- 5) Additional language regarding tank mounted lightning arrester clearances will be added. If suitable grading of local stresses allows smaller arrester clearances there must be agreement between the user and manufacturer.
- 6) It will be noted that the clearances for 345 kV and 500 kV which are based on an upper limit of 3.8 p.u. phase-to-phase switching impulse level, were also based on the use of closing resistors in the circuit breaker.
- 7) It was agreed that the minimum clearances between bushing top sheds would also be given.
- 8) The source of the curve relating to phase-to-phase switching impulse levels in Note 1 will be specifically referenced.
- 9) Several bibliographical references will be verified.
- 10) It was suggested that the paragraph defining the increase in high altitude clearances should be a footnote on Table II.

There was additional discussion regarding clearances for animal intrusion, however, it was decided to leave the Table in tact. A joint ballot of both the Working Group and Subcommittee was approved.

Bob Veitch has volunteered to assume responsibility for this Task Force., since Mr. Douglass will no longer be available.

Revision of Impulse Test Guide

Work which is underway regarding sections on digital techniques and switching surge tests were discussed.

Thomas Freyhult requested comments on his Draft 1 of the proposed sections on digital recording. It was agreed that we will try to set instrumentation requirements and not actual pass/fail levels at this time. It was noted that work is underway in IEC on this topic and their efforts will be reviewed. Dennis Allan reported on tests he conducted which point to problems in developing agreed upon transfer functions for the digital waveforms. A copy was distributed to the Task Force and will be reviewed with it. There was concern we may have the IEC document thrust upon us.

Gary Hall presented an outline of the proposed switching surge section which he is preparing. Mr. Hall reviewed each section of the outline and requested members to send comments on the outline to him as soon as possible. He was

planning to have the first draft prepared in six to eight weeks.

NEW BUSINESS

It was reported that Harold Moore will be assuming the duties of Chairman of the Working Group on Dielectric Tests. The outgoing Chairman, John Bergeron, expressed appreciation to Mr. Moore for willingness to assume the work associated with the chairmanship of this Group.

B. Working Group for Revision of Dielectric Testing of Distribution Transformers - C. V. Brown

This Group met on Monday, November 2, 1987 at 1:00 P.M. with 13 members and 6 guests present.

Messrs. D. A. Barnard and J. F. Goodavich have resigned from the Group because of changes in work assignments. Messrs. G. E. Henry III and Larry Lowdermilk have requested membership in the Working Group.

The minutes of the May 11, 1987 meeting in Ft. Lauderdale were approved as submitted.

Bill Henning reported that he had received no written comments on Draft 5 of the Routine Impulse Test for Distribution Transformers which was recently mailed to Working Group members. Comments from C. V. Brown on Paragraph 10.4.2 led to a re-write of Paragraphs 10.4.2 and 10.4.3 to combine them and clarify their intent. Written copies of the re-written paragraphs were not available, but, Bill read them aloud to the Working Group. The Group agreed that the new version was acceptable so Bill will send it to the Working Group and Subcommittee members for ballot. The negative vote on Draft 4 has been satisfied by the arrangement and wording in Draft 5.

The meeting was adjourned at 2:00 P.M.

C. Working Group on Partial Discharge Tests for Transformers
H. R. Moore

The Working Group met at 8:00 A.M. on November 3, 1987 with 16 members and 24 guests present.

The minutes of the Ft. Lauderdale meeting were approved as written.

Task Force for Measurement of Apparent Charge
G. Vaillancourt

Mr. G. Vaillancourt, Chairman of the Task Force for Measurement of Apparent Charge, reported on the Task Force meeting held on November 2. The Trial Use Guide for Partial Discharge Measurement in Liquid Filled Power Transformers and Shunt Reactors was submitted to the Standards Review Committee. Mr. Vaillancourt reported that the document was approved as submitted. It is expected that the document will be published early in 1988 in the C 57 Standards Book.

Mr. Vaillancourt will become the Chairman of the Working Group on Partial Discharge Tests and he announced that Mr. W. J. Carter will be the Chairman of the Task Force for Measurement of Apparent Charge. The Task Force will develop a format to be used for collection of apparent charge data from transformer and reactor tests. The Working Group was asked to furnish apparent charge data from factory tests.

The Working Group expressed their appreciation for the work accomplished by ~~Mr.~~ Vaillancourt on completing this important trial use guide. Mr.

Task Force for Acoustic Detection of Partial Discharge
E. Howells

Mr. E. Howells, Chairman of the Task Force for Acoustic Detection of Partial Discharges reported on their meeting held on November 2. The Ninth Draft of the proposed guide for Acoustic Detection of Partial Discharges has been prepared and is now ready to submit for balloting.

The Task Force has decided to expand their efforts into location of partial discharges by utilizing additional methods for acoustic measurement. The work to date has been based on the device developed in conjunction with EPRI. These additional methods are expected to include other external mounted sonic devices and internal detectors such as waveguides. The title for the new task will be Acoustic Location of Partial Discharges.

Mr. Howells will prepare a statement on the scope of this new task since the use of acoustic techniques will be different when making factory measurements as compared to field measurements. Mr. Howells asked the Working Group to furnish information on other acoustic measurement methods for use in this work.

At the Working Group meeting, it was decided that the Ninth Draft of the propose Guide for Acoustic Detection of Partial Discharges will be balloted in the Working Group and the

Subcommittee at the same time.

The Working Group expressed their appreciation to Mr. Howells and the Task Force for the work accomplished on the use of acoustic methods.

There being no further business brought before the Working Group, the meeting was adjourned at 8:50 A.M.

D. Low Side Surge Requirements for Distribution Transformers

R. E. Lee

The second Round Table Discussion on Low Side Surge Requirements for Distribution Transformers met at 8:00 A.M. on November 2, 1987 in New Orleans with 29 attendees.

After introduction of attendees, the minutes of the May 13, 1987 Fort Lauderdale Round Table were discussed. Cal Keppeler suggested two changes:

- 1) On pages one and two, replace "...failure near the low side ..." with "...failure near the grounded end ..." in two occurrences.
- 2) In paragraph two of Section 2 on page one, change "The research determined the ..." to "The research determined a ...".

After discussion, the minutes were approved with these corrections.

The attendees at the May 13, 1987 meeting recommended formation of a Task Force to address Low Side Surge Requirements for Distribution Transformers. The Chairman stated that this request is before the Administrative Subcommittee at its November 2, 1987 meeting. The group at today's Round Table confirmed the necessity to establish a Task Force.

During discussion of data acquisition and analysis, and the development of a standard test, the systems aspect of this problem was recognized. We agreed that the Task Force should define the required data and that the EEI T&D Committee is the appropriate organization to gather the data. Much discussion centered around the difficulty to collect complete data and its contribution to a Distribution Transformer Reliability Data Base.

Don Duckett provided copies of two papers presented at the October 21, 1987 EEI T&D Committee meeting in San Francisco. They are entitled "Transformer Failure Measurements" and "Wisconsin Public Service Corporation Transformer Failure Analysis". These papers will be distributed to attendees of the two Round Table Meetings.

Olin Compton suggested that, as this problem unravels, more evidence appears to support a "systems" approach to a solution rather than only an equipment solution. He suggested that impulse grounding rather than conventional (steady state) grounding may be a significant part of the problem. IEEE/PES SPD and T&D Committees are areas of expertise that should be consulted.

Chuck McMillen suggested that manufacturers may wish to research possible testing methods on an individual basis.

Jim Arnold's June 4, 1987 letter provided insight into the cost of potential customer equipment failure and the resultant damage claims. His experience shows that customer costs may outweigh the utility cost of equipment replacement. This adds another perspective to the issue.

We agreed that the Scope of Activity for the Low Side Surge Requirements for Distribution Transformers Task Force includes: data gathering and analysis; systems design analysis; and development of a standard test.

If a Task Force is established the following individuals are willing to work on specific tasks:

- 1) Contact EEI T&D Committee - Bob Lee
- 2) Define data requirements - Don Duckett, Jeewan Puri, George Henry, Charlie Brown
- 3) Contact IEEE/PES SPD and T&D Committees - Bob Lee
- 4) Standard Test - Steve Smith, Chuck McMillen, Larry Lowdermilk, Jeewan Puri, and Tom Brennan.

The meeting adjourned at 9:25 A.M.

5. NEW BUSINESS

A. Low Side Surge Requirements for Distribution Transformers

The Chairman reported on AdSubCom action regarding establishment of a Task Force. The Administrative Subcommittee approved establishment of the Task Force but limited its Scope to:

- 1) Define the problem.
- 2) Gather and analyze data.
- 3) Determine if a test is required.

B. Correspondence - Instrument Transformers Subcommittee

- 1) Ralph Stettson provided an excellent description of a potential problem involving instrument transformer testing requirements at the higher voltages vs. the requirements for bushings and transformers. Charlie Honey and Mike Altman will review the Tables in the Instrument Transformers document and report to the Subcommittee at its Washington meeting. Harold Moore will draft a response regarding the testing requirements and suggest a transfer of Dielectric Tests experience to Instrument Transformers.

- 2) Another item in Ralph's letter stems from Charlie Honey's concern for testing and standardization of free-standing 500 kV CTs, and their in-service failure.

Discussion of this subject revealed several failures of these devices throughout the industry. Since there was sufficient interest, George McCrae assembled names and addresses of 17 interested individuals. Mike Altman has agreed to chair a discussion of the subject during the Washington meeting.

6. ADJOURNMENT

The Dielectric Tests Subcommittee meeting adjourned at 2:44 P.M.



Robert E. Lee
Chairman

DRY-TRANSFORMER SUBCOMMITTEE MEETING
NOVEMBER 3, 1987, NEW ORLEANS, LOUISIANA

The Dry-Type Transformer Subcommittee met at 1:50 PM on Tuesday, November 3, 1987, in the Orleans West Room of the Montelone Hotel, New Orleans, Louisiana. Present were 13 members and 12 guests. Following the introduction of those present, the chairman requested that the minutes of the previous meeting of May 13, 1987 in Fort Lauderdale, Florida be approved. Following a motion to this effect, the minutes were unanimously approved without comment. Next, the chairmen of the working groups presented reports of their meetings as follows:

1.0 Dry-Type Reactor Task Force - Mr. Richard Dudley, Chairman.

The Task Force met on Monday at 8:00 AM with 3 members and 5 guests. The present mission of this Task Force is to prepare additions or revisions, which can be incorporated into present reactor standards undergoing revision, particularly ANSI C57.21, "Requirements for Shunt Reactors".

1.1 The minutes of the previous meeting at Fort Lauderdale, Florida, were reviewed with relevance to changes proposed and now incorporated into Draft #5A of C57.21. These included:

- (a) Sound level measurements
- (b) Impulse testing of low impedance windings
- (c) Temperature limits for dry reactors, Table #2 and Table #3
- (d) A section dealing with construction and installation of dry-type reactors

1.2 Draft #5A of C57.21 was then reviewed in detail. In particular:

- 1.2.1 In addition to extending the temperature rise categories in Tables #2 and #3 to cover 55°C, 80°C, 115°C, and 150°C, it was agreed to include a column in Table #3 listing the insulation systems for each allowed maximum average winding temperature rise.
- 1.2.2 Table #6 on insulation test voltages was discussed, and it was suggested by Mr. Honey and agreed by the group to change the crest value of the chopped wave impulse test to 110% of the full wave impulse test instead of 115%. This is in line with the use of metal oxide arresters.
- 1.2.3 Section 10.3.4, Partial Discharge Measurements, should have a note or paragraph added to explain that partial discharge testing is not applicable to dry-type shunt reactors, since the applied voltage stresses only the insulators providing insulation to ground.
- 1.2.4 The comments in Section 10.3.5.2 on impulse testing of low impedance windings were accepted and deemed necessary to be included in the standard. This has to do with the fact that in such cases the desired time to the 50% voltage point simply cannot be obtained with available test equipment.

C57.96 has been sent to the Sds Board

- 1.2.5 In the review of Section 10.7.4.4 on sound level measurement, a missing figure was the only issue. It had been submitted but was inadvertently left out of the draft.
- 1.2.6 Section 12, "Construction and Installation of Dry-Type Reactors", was reviewed and, other than some minor changes, was deemed by users present as being an important, needed addition to the standard.
- 1.3 The Chairman agreed to take all issues to Mr. Bill Kennedy's task force on dielectric testing and to Mr. Jack McGill's working group on Shunt Reactors for further revision of C57.21.
- 1.4 There being no other business, the meeting was adjourned at 9:40 AM.
- 2.0 Working Group on "Insulation Requirements for Specialty Transformers", IEEE Std. 259. Chaired by Mr. Alan Iversen.
- 2.1 The working group met Monday at 8:00 AM with 5 members and 12 guests present. Following introductions, the minutes of the previous meeting on May 11, 1987 in Fort Lauderdale, were distributed, read, and approved as written.
- 2.2 Draft #2 of P259 was distributed. A number of revisions were discussed, particularly in the section describing test procedures. The working group was requested to provide comments or suggestions for improvement. Two members volunteered to update the list of standard references and the bibliography.
- 2.3 Draft #3 will be prepared and distributed before the next meeting in Washington, D.C. - April 11, 1988.
- 2.4 There being no further business, the meeting adjourned at 9:30 AM.
- 3.0 Working Group on Standards for Dry-Type Transformers Incorporating Solid Cast and/or Resin Encapsulated Windings - PC57.12.01. Mr. Egon Koenig, Chairman.
- 3.1 The working group met on Monday at 10:05 AM with 20 members and 14 guests. Following introductions, the minutes of the previous meeting at Fort Lauderdale were approved as submitted.
- 3.2 A review of the results of balloting in the Transformers Committee on Draft #4 of PC57.12.01 revealed the following:

Ballots mailed	123
Ballots returned	109
Ballots approved	73
Ballots approved with comment	12
Ballots not approved	3
Ballots not voting	21

88.6% of the ballots were returned of which 96.6% were affirmative.

- 3.3 One of the three negative votes pertained to low frequency tests, Section 5.10.3.2, wherein the language used was incorrect and in conflict with C57.12.80, "Transformer Terminology". By changing this language discrepancy, the negative vote was resolved.
- *3.4 One negative ballot dealt with the fact that the IEC temperature classification of 180° is accompanied by a 125°K maximum average winding temperature rise; whereas the corresponding temperatures proposed for C57.12.01 are 180° and 120°K respectively; the IEC winding rise being 5° greater than the proposed rise in this standard. In a follow up letter to the dissident voter, the chairman of the working group reviewed the changes based on IEC 726-1982, wherein there had originally been the temperatures of 185° C and 125°K, but which were subsequently and recently changed to 180° C and 125°K. In other words, the insulation temperature classification had been reduced 5° but not the average winding temperature rise. It was felt by the working group more appropriate to keep the same difference of 60° between the temperature classification and the maximum winding temperature rise. The dissident voter reluctantly agreed to go along with the temperatures proposed - thereby resolving this negative vote.
- 3.5 The third negative vote was on Table 4b and asserted that not enough data was available to justify this separate table on temperature rise for cast coils. As a result of considerable discussions, three separate motions were made and carried. They were:
- 3.5.1 Eliminate Table 4b and retain Table 4a.
 - 3.5.2 Incorporate in Table 4a two new insulation temperature classifications of 130° C and 200° C with their respective maximum average winding temperature rises of 60°K and 130°K.
 - 3.5.3 Add a note to Table 4a stating, "Higher average winding temperature rises by resistance may apply if the manufacturer provides thermal design test data substantiating that the temperature limits of the insulation class are not exceeded".
- 3.6 In view of all the foregoing, it is proposed to reballet in the Transformers Committee the relevant subsections under Section 5, "Rating Data".

*Please note the digression made to help clarify the issues involved in 3.4 and 3.5. See last page of this report.

- 3.7 The working group interrupted its work for lunch at 12:00 noon and then continued, starting at 1:10 PM, to review the remainder of the document with respect to comments in the affirmative ballots.
- 3.8 The meeting was adjourned at 2:55 PM.
- 4.0 Working Group on Thermal Problems - Mr. Bill Mutschler, Chairman.
- 4.1 The working group met on Monday at 3:00 PM with 20 members and 5 guests present.
- 4.2 Before discussion began ^{sent to Specs Board} on thermal considerations, the chairman distributed copies of C57.96, "Loading Guide", and reported that this draft (10.3) had ~~only~~ one more hurdle to clear before being passed on to the Standards Board, namely, coordination with the Power Generation Committee. Mr. T. R. Whittemore, Standards Administrator of that committee, indicated that every effort will be made to expedite approval.
- 4.3 Considerable discussion then followed on hot spot allowances for dry-type transformers. To help bring a better focus on the issues, the chairman proposed that a small task force be established to report on parameters for hot spot allowance to be reviewed by the working group at the next meeting.
- 4.4 The chairman requested the members of the working group to be prepared to discuss thermal time constants at the next meeting. The meeting was adjourned at 5:00 PM.
- 5.0 Working Group on Dielectric Problems - Mr. Don Kline, Chairman.
- 5.1 The working group met Tuesday at 8:00 AM with 14 members and 10 guests.
- 5.2 With reference to the "Proposed Recommended Practice for the Detection of Partial Discharges and the Measurement of Apparent Charge in Dry-Type Transformers" - PC57.124, comments from Mr. George Vaillancourt of the Dielectric Tests Subcommittee, were reviewed. These had to do mainly with editorial issues in coordinating with the liquid transformer partial discharge measurement guide.
- 5.3 A review of the test circuit and the discussions related thereto led to:
- (a) Keeping the wide band filter
 - (b) Adding polarity designations to illustrations of example circuits
 - (c) Eliminating any necessity for additional sensitivity to narrow band filters

- 5.4 It was decided to add a statement in the forward concerning the sequence of tests and the selection of partial discharge tests of bus bar components as being separate from that of isolated coils.
- 5.5 As a separate matter, the chairman advised that the present status of PC57.12.58, "Transient Voltage Analysis of Dry Type Transformer Coils", continues to be one of completing coordination with IAS and IEC.
- 5.6 The meeting was adjourned at 9:30 AM.
- 6.0 Working Group on Thermal Evaluation of Insulation Systems for Solid Cast and/or Resin Encapsulated Power and Distribution Dry-Type Transformers" - Mr. George Bowers, Chairman.
- 6.1 Mr. Bowers was unable to attend the meeting and had not yet completed the balloting of the Transformers Committee with Draft #7 of the proposed guide. Accordingly, the status of this project has not changed, since the meeting in Fort Lauderdale.
- 6.2 This same working group has also undertaken a surveyance of development of any technical or regulatory events relating to flammability of dry-type transformer insulation systems. Because of Mr. Bower's absence, no information was available for this meeting.
- 7.0 The Working Group on Through Fault Current Duration Guide for Dry-Type Transformers. Chaired by Mr. R. E. Uptegraff, Jr.
- 7.1 This working group has completed its work, but the guide has been in limbo at IEEE headquarters in New York. As soon as the Loading Guide is submitted to the Standards Board, both guides will move through the approval process together.
- 8.0 Following the working group reports, the chairman reviewed a number of issues having various degrees of interest. These included:
- 8.1 Proposal of participation with ASTM to develop more sophisticated methods of measuring dry-type transformer sound. Mr. L. W. Pierce volunteered to join the ASTM Task Force, E33.08A.
- 8.2 Announcement of the availability of C62,11-1987 "IEEE Standard for Metal Oxide Surge Arresters for AC Power Circuits".
- 8.3 A proposal to enlarge upon the number of letter symbols used in loading guide formulas and other applications of this sort.

- 8.4 A discussion of developing a task force to undertake revising and reaffirming C57.16, "Requirements, Terminology and Test Code for Current-Limiting Reactors", with the possibility of making this exclusively a dry-type reactor standard.
- 9.0 There being no further business, the subcommittee meeting was adjourned at 3:05 PM.

Submitted by: R. E. Uptegraff, Jr.
Chairman
Dry-Type Transformer Subcommittee
November 10, 1987

DIGRESSION FOLLOWING SECTION 3.3

At this point, it may be helpful to explain that the mission of this working group is to accommodate the cast-coil winding in the "Standard Requirements for Dry-Type Transformers". In the past, this standard has contained three temperature classifications of insulation - 150, 185, and 220°C for which the maximum average winding temperature rises by resistance are respectively, 80, 115, and 150°K. The difference between the temperature classification and the temperature rise is 70°K, which is the sum of a 40°C maximum ambient temperature and a 30°K hot spot allowance.

Now, it was attempted to introduce three new temperature classifications and temperature rises. These are 130, 155, and 180°C Insulation System Temperature and 80, 100, and 120°K maximum average winding temperature rises with differences of 50, 55, and 60°K respectively. With a 30° ambient, the hot spot allowance would be 20, 25, and 30°K, although this was not explicitly stated. These three new temperature classifications were restricted to apply only to cast coils; and a separate table, Table 4b, was added to the section on temperature rise and insulation system capability. The purpose for this addition was to try to "harmonize" the temperature criteria more closely with IEC Dry-Type Transformer Standards. With this understanding in mind, let us continue with the report of the working group chairman.

REUjr
11/10/87

Meeting Minutes
Insulation Life Subcommittee
of the
IEEE Transformer Committee
Monteleone Hotel
New Orleans, Louisiana
November 3, 1987

The Insulation Life Subcommittee met on Tuesday, November 3, 1987, at 11:15 a.m. A total of 70 were present consisting of 28 members and 43 guests.

After the introductions were made, the minutes of the previous meeting in Fort Lauderdale on May 12, 1987, were approved and issued.

It was announced that the Subcommittee will sponsor a "Symposium" entitled "An Update on Bubble Evolution from Transformer Cellulose Insulation" at the Spring IEEE Transformer Committee Meeting in Washington, D.C., in April of 1988.

- Most everyone is familiar with the bubble evolution phenomenon which is more limiting to "beyond nameplate loading" than insulation aging or loss of life.
- Back in the early 1980's two significant McGraw Edison papers were published and two EPRI Projects on "Transformer Life Characteristics" were completed which contributed to bring^{ing} the bubble phenomenon to the forefront of our thinking.
- Subsequently two additional EPRI Projects were initiated, and are now complete, to study specifically this bubbling phenomenon:
 1. One project, by Westinghouse, tested winding models and full size transformers.
 2. The second project, by GE, developed a Mathematical Model for bubble evolution in transformers.
- The purpose of this Symposium will be to bring the Transformer Committee up to date on the results of these last two EPRI projects and other related R&D works.

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 at 8:00 a.m. on Monday, November 2, with 23 members and 27 guests present.

Linden W. Pierce of GE Rome and Dennis Gerlach^h of the Salt River Project asked to become members of the working group.

Following the introductions and approval of the minutes of the Fort Lauderdale meeting, the meeting moved into the presentation of reports:

Since Jacques Aubin of Hydro Quebec was absent from this meeting there was no report given on the progress of the IEC Loading Guide revisions (IEC 354.). This guide should be nearing the publication stage.

It was announced that the Loading Guide for Regulators C57.95 is to be published very soon.

The activity to revise and combine the three loading guides: C57.91 for distribution transformers, C57.92 for power transformers 100 MVA and below and C57.115 for above 100 MVA ~~evolved~~ evolved around the following Task Group reports:

1. John Mathews submitted a proposed write up for the GENERAL Section of the combined guide for the comments by the Working Group. Discussion centered around the need for further work on equation symbol standardization and the inclusion of a temperature equation for resistance correction.
2. Dave Takash had presented a draft of Section 4 of the new guide pertaining to Distribution Transformers. It was decided that 55°C rise data need not appear in the body of the new guide but will be discussed only in the Appendix.
3. Jerry Grimes indicated he has been slowed in his efforts to complete a draft of the POWER TRANSFORMER SECTION of the new guide due to a number of his Task Group members dropping out. He was reminded that such sticky subjects as a stray flux heating factor, measurement of top soil and hot spot allowance have yet to be resolved. Several Working members volunteered to join Mr. Grimes' group to help out.
4. Dan Perco reported on activities associated with the APPENDICES SECTION. His group met Sunday afternoon. A lively discussion arose regarding periodic (possibly annual) operation of NLTC to prevent film build up and overheating. Users consensus, however, was that this was both impractical and could cause more serious problems, such as poor contact alignment when returning to the original tap position.

Various other discussions centered around the above four reports. The Chairman will attempt to blend the Sections together for working group comments prior to the next meeting.

The next report was given by Bob Grubb Chairman of the Working Group on Thermal Tests.

Bob reported that the Working Group on Thermal Tests met on Monday, November 11, at 3:05 p.m., with 8 members and 8 guests in attendance. One new member, Linden Pierce, was welcomed into the group. After introduction, s Chairman Bob Grubb indicated that after his inability to attend the last meeting, he had concentrated on incorporating the comments from Draft 9 into a Draft 10 of Project No. P838. "Recommended Procedures for Performing Temperature Rise Tests On Oil Immersed Power Transformers At Loads Beyond Nameplate Ratings", and on preparing a draft of a tutorial appendix which explains the rationale behind P838 and outlines some of the difficulties involved in its preparation. Draft 10 and the tutorial appendix were distributed at the meeting.

In order to get the project moving again, it was decided to spend the time during the meeting reading and reviewing the tutorial. The members present decided that the format of the tutorial met its intended requirements, and discussion concentrated on a detailed review of the document. No major objections were voiced to the contents, with comments being either editorial in nature or involving clarification of the expressed concepts.

As the allotted meeting time was nearing conclusion, this review was not completed. The Chairman requested that the attendees hand in their marked up copies. These comments will be incorporated into the appendix, and it is intended that the appendix will be mailed out for balloting to the Working Group members by mid-November for return by mid-December. Provided there are no major objections to the appendix, it will then be incorporated into Draft 10 and submitted for ballot to both the Working Group and the Insulation Life Subcommittee for return prior to the next meeting.

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

The third Working Group report was given by Al Wurdock, Chairman of the Working Group on Thermal Evaluation of Power and Distribution Transformers.

Al reported that they met on Tuesday morning, November 3, 1987, at 8:00 a.m. with 10 members and 25 guests present.

After introductions and approval of the minutes of the May 12 Fort Lauderdale meeting, it was reported that a PAR was received for the new document being worked on entitled "Standard Test Procedure for Thermal Evaluation of Oil Immersed Distribution and Power Transformers". The project designation is now PC57.126.

It was noted that someone other than a member of the working group had added the words Rated Less than 100 MVA to the title on the PAR. Since the intent of the document was to cover all oil immersed transformers, Jim Harlow volunteered to check on why this wording was added.

Draft 1 had been sent out to the working group for review and comments were discussed.

The Foreword will require a significant rewrite. Lin Pierce volunteered to do this.

The Scope of the document will be revised to indicate that the test procedures are to evaluate the aging characters of insulation systems and not the effect of bubbling. A suggestion was made to eliminate the separation in the guide ~~for~~ for power and distribution transformers. Chuck McMillan reminded us that since power and distribution transformers have different Arrhenius curves, they do require different test procedures.

A lengthy discussion was held on the use of the short circuit test as an end point test. It was pointed out that its purpose was not to test short circuit strength but merely to produce winding movement in the model similar to that experienced in a full size transformer under a short circuit. It is this movement along with the aging of the insulation which dictates the point of end of life normally ~~accompanied~~ accompanied by a dielectric breakdown.

Al indicated he will contact Dean Yanucci of Westinghouse for his promised input on the construction of sub-assembly models that could represent both core and shell transformers up to transformer sizes of several hundred MVA.

The Chairman will include the revisions to Draft 1 suggested at the meeting and will issue Draft 2 for review before the next meeting.

The meeting adjourned at 9:30 a.m.

Under New Business, Cal Kappeler asked for help from our Subcommittee in responding to a letter to him and other small transformer manufacturers from Mr. Jerry Thompson of Duke Power. They are considering new company guidelines which would allow up to 300% of nameplate loading during cold load pickup. The duration of this loading could be in the 1 to 3 hour duration.

Mr. Thompson asked how he can evaluate the life expectancy of such a loading practice being that the ANSI guides do not cover overloads of such a magnitude.

This request was referred to Bill Wrenn, who in his work as Chairman of the Guides for Loading Working Group, is covering cold load pickup.

There being no further new business the Subcommittee meeting was adjourned.

Respectfully Submitted



D. H. Douglas
Subcommittee Chairman

DHD:lms

PERFORMANCE CHARACTERISTICS SUBCOMMITTEE
New Orleans, Louisiana - November 3, 1987
MEETING MINUTES

INTRODUCTION / ATTENDANCE

The Performance Characteristics Subcommittee (PCS) met at 10:00 AM on Tuesday, November 3, 1987 with 32 members and 42 guests registering their attendance.

APPROVAL OF MINUTES

The minutes of the May 12, 1987, PCS meeting were approved as submitted.

CHAIRMAN'S REMARKS

There were no liaison reports.

At the Administrative Subcommittee, several items of interest were identified:

It was noted that with every PAR approval, NesCom sends a form letter which includes the bold type statement:

Copies of all draft standards documents and minutes of all meetings on standards projects should be forwarded to the secretary of the IEEE standards board.

Speakers are needed for IEEE chapters and sections.

Meeting locations for 1991 have not been determined, volunteers are needed.

PCS membership now stands at 51.

AGENDA CHANGES

No agenda changes were identified.

WORKING GROUP (WG) REPORTSTransformer Reliability

D. J. Cash reporting for H. F. Light, Chairman

The WG met very briefly on Monday, November 2, 1987, at 3:05 PM with 9 in attendance. Don Cash filled in for chairman Harold Light who was still unable to attend.

Harold has still not received any reply from E. Paul Lange, Secretary of the Standards Review Committee. The document has been approved previously by the IEEE Standards Board, but it's current status is unknown.

Harold also suggested that perhaps the WG would want to review the present Reliability Guide following completion of the work being done on the Failure Analysis Guide.

There being no further business, the meeting was adjourned.

Qualification of Transformers for Class 1E Application in Nuclear Power Stations

W. H. Mutschler reporting for L. B. Stensland, Chairman

Three members of the WG met on Monday, November 2, 1987, to discuss negative ballots and comments received from SC-2.

The major area of concern was the information contained in the appendix to the draft. A re-draft of the section was developed, which appears to answer this concern.

If this is acceptable to SC-2, Draft 16 will be issued for ballot by SC-2 and the IEEE Transformers Committee.

*TX/C
Ballot in mind*

Transformers Directly Connected to Generators

B. K. Patel, Chairman

The WG met at 1:05 PM on November 2, 1987, with 7 members and 8 guests present.

After the usual introductions, the minutes of the Ft. Lauderdale meeting were approved with one change: "Chetwood" will be changed to "Chitwood"

Draft 10 was received at the meeting. This draft incorporated the comments discussed at the last meeting in Ft. Lauderdale and also comments received from the liaison groups on Draft 9. Draft 9 was the one balloted last March in the main committee and the PCS. A few additional editorial comments were discussed at the meeting.

Transformers Directly Connected to Generators (Continued)

The meeting was concluded with the understanding that the chairman will revise Draft 10 as soon as possible and circulate with the WG for a final review. This draft 11 is expected to be processed prior to the next meeting in Washington D.C.

There was no old or new business discussed at the meeting.

The meeting adjourned at 2:15 PM.

Test Code for Shunt Reactors J. W. McGill, Chairman

The WG met at 3:05 PM on November 2, 1987 with 7 members and 4 guests present.

Minutes of the last meeting in Ft. Lauderdale were approved as written.

Draft 5A was re-balloted to all the WG members prior to this meeting. The previous draft had to be reworked due to some major changes, therefore the present draft 5A, incorporating these changes had to be re-balloted in the WG.

Draft 5A was discussed during the WG meeting. Those members not present will comment on their returned ballot, due November 30, 1987. The major items discussed are outlined below:

The coordinates for the non-linear magnetic characteristic curve were changed to RMS voltage and RMS current.

Table 2 (Average Temperature) was modified for dry-type 115 degree C rise shunt reactors.

An additional column titled "Insulation System" was added to Table 3. Also, footnote 4 was clarified.

A paragraph was added under the "Total Loss" section to note that additional losses will be present in adjacent metallic structures due to external magnetic fields for dry-type shunt reactors. Also, a sentence was added to clarify the use of average losses as guaranteed losses on multiple unit orders.

The words "shunt reactors" were added to figures 4, 5, and 6.

A microphone position diagram was added to Figure 8 for dry-type shunt reactors, where 2 or more shunt reactors are close together.

When all the WG ballots are collected, comments and negative votes clarified, it is planned to issue Draft 6 and ballot in the PCS before the next meeting.

The meeting was adjourned at 4:30 PM.

Failure Analysis

D. J. Cash, Chairman

The working group met at 1:00 PM on Monday, November 2, 1987 with 20 members and 17 guests present. Following introductions of members and guests, the previous minutes were approved as presented.

Four new members; Michael Altman, Larry Dix, Dennis Johnson, and David Payne were added to the WG.

The task force met in Detroit on August 19, 1987, and produced Draft 5 of the "Guide for Failure Investigation, Documentation and Analysis for Power Transformers and And Shunt Reactors." This draft was distributed to the WG with the following results:

- 40 ballots sent out to WG members
- 22 ballots returned
- 11 approved
- 8 approved with comments
- 2 not approved
- 1 not voting

Both negative ballots were discussed at length.

The first one asked for: 1) develop more guidelines to assist in what to do when a transformer is suspected to be unfit for service and 2) expand the appendix section A.1. on "Evaluation of Electrical Test Results". Mixed reactions were voiced on this negative ballot ranging from insurance concerns to a need for a better understanding of what the tests mean. Other comments suggested that references should be made to existing guides where possible.

The second negative ballot was discussed by it's presenter. He offered that most voltage ranges in table 9, "Relative Voltage Stresses in Core Form Transformers" should be increased by an order of 10, due to the additional stresses caused by interleaving of coils. He also suggested that investigators should look at the good legs of a transformer following a failure. One can gain much evidence of the cause of failure by doing so. This was supported by other members of the group.

Resolution of both negative ballots will be attempted by the task force.

Several other comments were discussed as the WG reviewed the Guide on a section by section basis.

A discussion was held on whether of not to ballot the PCS on Draft 6. It was the consensus of the WG that the next draft still be balloted at the WG level.

The task force will meet again in January or February of 1988 to review all comments of the WG and incorporate them into Draft 6.

The chairman thanked the WG for their valuable comments that are helping to shape the guide into a very useful tool. There being no other business, the meeting was adjourned.

*WG to ballot
latest draft*

Loss Tolerance and Measurement

W. R. Henning, Chairman

This report will cover the meeting of the Loss Measurement Guide Task Force and the meeting of the WG on Loss Tolerance and Measurement. The Task Force met at 10:05 AM with 12 members and 28 guests present. The WG met at 3:05 PM with 16 members and 15 guests present.

The business of the task force was to rewrite Section 9 of C57.12.90 on load losses and impedance voltage. A written draft was prepared by Jim Antweiler and was sent to members before the meeting. Attention was paid to the following points:

The organization and terminology was changed in a few places

Reference was made to Section 5.1, which specifies a 3 to 8 hour waiting time before assuming the liquid temperature and the winding temperature and the same. The application of this to distribution transformers will be explored by Jeevan Puri.

The voltage source and connections shown in the connection diagram, Figure C, will be changed to make them more clear.

A proposal to limit the maximum correction for phase angle error to 5% along with the .5% tolerance on frequency and the size of the conductors was discussed. Some felt that if a specific tolerance on overall measurement accuracy is developed, as is planned, then there would be no need to specify limits on individual quantities like phase angle, etc.

The WG discussed the bridge method of loss measurement. Though no final decision was reached, it is planned to NOT allow the bridge method use for no load loss tests, but WILL allow it's use for load loss tests, if done on a single phase basis.

At the next task force meeting we will go over this proposal for section 9 in detail.

The WG devoted a large part of it's meeting to a detail review of the Section 8 draft on no load losses and exciting current. Many small changes were made to the wording and it is now ready for balloting.

The last subject discussed at the WG was a tolerance for losses. Steve Moore had agreed to approach EPRI as a vehicle to sponsor a round-robin test. It does not appear likely that EPRI will sponsor this, but it is possible. The next step will be to sent information on Eddy So's device to WG members so that we can develop a proposal.

The meeting adjourned at 5:00 PM.

Semi-Conductor Rectifier Transformers

G. C. Bryant, Chairman

The WG met on Monday, November 2, 1987 at 8:00 AM, 10:05 AM and 5:00 PM. There were 12 members and 6 guests present.

The Ft. Lauderdale minutes were approved as written.

Copies of Draft 6 of C57.18.10 were passed our for study and comment. The discussion concentrated on sections 8.6, "Load Losses" and section 8.1, "Heat Run"

Much discussion involved the proper division of stray losses between eddy current losses and other stray losses. It was decided that losses calculated by the method outlined in 8.6.2 should be used for reporting purposes only, on both liquid filled and dry-type rectifier transformers, and that separate methods by used for heat run tests.

Revisions were discussed for equation 1 and 2 and table 11 dealing with the increase in losses caused by harmonic components in load current under rectifier operation. These equations and the table will be revised to reflect harmonic current contribution to losses as percent of total RMS current instead of a percent of the fundamental current.

In 8.6.3 paragraph 5, describing circuit 31 tests, it was agreed to add a sub-paragraph D on circuit 31 with 2 parallel primary windings, each associated with a separate secondary winding group.

On section 8.1; heat run tests, it was agreed to separate liquid filled transformer tests from dry-type transformer tests. It was also decided that liquid-filled transformer heat run tests should be done in accordance with C57.12.90 except that during the last hour of the test, the current will be reduced to a level equivalent to that derived by using the calculated load losses including harmonic effects.

Minor revisions were made to three tables dealing with dielectric tests.

It was decided to meet again on November 3, 1987 at 11:15 AM at an open time for most of the committee. This will be to discuss details of the heat run tests.

Plans are to complete the balloting on Draft 6 and publish Draft 7 by the next meeting time in Washington.

Pending approval of the Administrative SubCommittee, Charlie Pounds will be the chairman of the WG at the Washington meeting.

Tx Reliability WG

Reliability Guide is in print - No more meetings

Project Reports

LTC Position Indication

Robert Frazer has agreed to coordinate this project.

Nameplate Information Change Request

J. W. Matthews

The proposal to add "Directed Flow" to the nameplate is still on hold pending input from the Loading Guide WG.

Same status

Routine Resistance Test

C. J. McMillen

Ballot results were reported (Attachment PCS-A). Efforts continue to resolve the negative ballots. A change in wording, where the stray and eddy losses will be assumed to be constant, will require another ballot of the Transformer Committee.

Old Business

There was no old business.

New Business

There was no new business.

The meeting adjourned at 10:45 AM.

Dana Basel reporting for

John Borst, Chairman

Report to Performance Characteristics Subcommittee

Balloting on Project PC 57.12.00K Table 14.

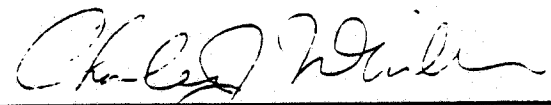
Revision of ANSI C57.12.00-1980, Table 14 to Make Resistance Measurements a Design Test for Three-Phase Distribution Transformers Rated 501 to 2500 kVA.

The results of balloting for this proposed revision are as of October 29, 1987.

Ballots Mailed = 123

	Transformer Comm.		Perf.Char. Subcommittee	T.Com & S.C.	
	No.	%	No. (Not T Comm.Mbrs.)	Total	%
Approve	87	83.7	11	98	83.5
Not Approved	2	1.9	1	3	2.5
Abstain	4	3.8	---	4	3.4
No Return	11	10.6	2	13	11.0
Totals	104	100%	14	118	100%
No Longer Mem.	5			5	
Total	109			123	

Approval of Returned Ballots.....93.5% 91.7% 93.3%


 Charles J. McMillen 10/29/87



IEEE

TRANSFORMERS COMMITTEE

ENGINEERING
SOCIETY

Please Reply To:

CHAIRMAN
D. A. Yannucci
Virginia Power
Gravette
P.O. Box 1966
Richmond, VA 23261

November 11, 1987

VICE CHAIRMAN
Richard A. Weston
Harrisburg Eskant Transformer
141 Industrial St.
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SECRETARY
John J. Bergeron
Louisiana Power and Light
P.O. Box 60340
New Orleans, LA 70160

Mr. John J. Bergeron
Louisiana Power and Light
P. O. Box 60340
New Orleans, LA 70160

SUBCOMMITTEE CHAIRMEN:

ACOUSTIC SOUND and VIBRATION
Alan M. Teomsky
600 42nd St. 404
Brooklyn Park Bldg 306 S
New York, New York 10001

Dear John:

Subject: Awards Subcommittee Report

AC SERVICE
Loren B. Wagoner
American Electric Power
One Riverside Drive
Columbus, OH 43215

Certificate of Appreciation awards were presented to the following individuals:

**ADDITIONAL LETTERS
TRANSFORMERS and REACTORS**
William N. Kennedy
Westinghouse Electric Corp.
181 Holiday Drive
Pittsburgh, PA 15222

L. S. McCormick

Past chairman Dielectric Subcommittee

DIELECTRIC TESTS
Robert E. Lee
Pennsylvania Power & Light
P.O. Box 3328
Allentown, PA 18106-3328

Leonard R. Smith

Past Chairman of Standards Subcommittee

DRY TYPE TRANSFORMERS
Roy E. Utegraff, Jr.
R. E. Utegraff Mfg. Co.
P.O. Box 182
Moundsville, PA 15663

Ralph Stetson

Past Chairman of the Instrument Transformer Subcommittee

INSTRUMENT TRANSFORMERS
Ralph B. Stetson
General Electric Co.
20 Main St.
Connersville, NH 03875

The Transformer Committee thanks each of the above individuals for their contributions, and long and distinguished service.

INSULATION LIFE
Lester M. Douglas
General Energy Corp.
P.O. Box 3000
Cleveland, OH 44101

Sincerely,

D. A. Yannucci, Chairman
Recognition and Awards Subcommittee

INSULATION TESTS
Lester M. Douglas
General Energy Corp.
483 Spawville Ave.
Columbus, PA 17114

DAY/bvs

PERFORMANCE
General Electric Co.
1000 E. 17th St.
Westinghouse Electric Corp.
P.O. Box 182
Moundsville, WV 26041

RECOGNITION and AWARDS
John A. Weston
Westinghouse Electric Corp.
181 Holiday Drive
Pittsburgh, PA 15222

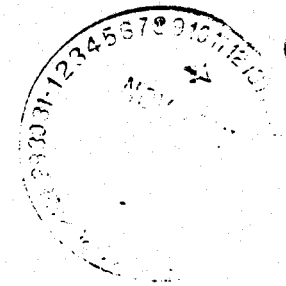
TRANSFORMER STANDARDS
William N. Kennedy
Westinghouse Electric Corp.
181 Holiday Drive
Pittsburgh, PA 15222



EPRI

Electric Power
Research Institute
November 9, 1987

Memorandum



To: Mr. J.J. Bergeron
Secretary, IEEE Transformer Committee
Louisiana Power & Light Co.
P.O. Box 60340
1010 Common Street
New Orleans, LA 70160

From: Stan Lindgren, Project Manager *SL*

Subject: EPRI LIAISON REPORT

The following is my report for November 4, 1987 meeting and inclusion in your minutes.

1. EHV Converter Transformer

- Hybrid Insulation Model tests have been completed.
- Test results confirmed 25% or greater size reduction can be attained with some further work.
- Final report is being drafted.

2. Amorphous Steel for Distribution Transformers

- GE reports they have shipped "many thousands" of commercial amorphous core transformers.
- An Allied announcement is expected soon regarding a new production facility.

3. Amorphous Steel for Power Transformers

- Improved flatness, edges, and greater width have been accomplished.
- 500 KVa unit has been installed and placed in service June 1987. No problems have been reported.
- Automated cutting and accumulation equipment purchase is approved and planned for or early 1988.

4. Improved Grain Oriented Silicon Steel for Transformers

- Project is on hold because contractor proposal delays.

5. Advanced Power Transformer

- Reduced load loss feasibility has been demonstrated.
- Detailed analytical studies are underway exploring individual design aspects.

6. Static Electrification in Power Transformers

- Suspected failure mechanism in over 12 core form and shell form FOA transformers worldwide.
- 4 basic physical mechanisms and more than 10 variable parameters have been identified.
- Work is now focused on monitoring instruments and quantification of parameters for mathematical models.

7. Bubble Evolution in Overloaded Transformers

- Very rapid load changes can cause bubble formulation under some conditions and reduce 60 Hz and impulse dielectric strength. Demonstrated in models with rapid/high O.L.
- GE report is published. Westinghouse report is in draft stage and expected to be published within a few months.
- Workshop is scheduled for December 8th & 9th, 1987 to discuss the reports.

8. Power Transformer with Two-Phase Cooling

- 75% perchlorethylene, 25% oil
- 65 mva unit went into full service October 31, 1986. *Comp Ed*
- Unit is carrying normal load without incident.

up to 15% above nameplate

9. Active Transformer Noise Cancellation System

- 2-year project started March, 1987.
- Noise reduction in one direction is being pursued first.
- Expect to demonstrate on a transformer in 1988.

10. Feasibility for Improved LTC

- One project focuses on conventional electromechanical and ways to minimize maintenance and transformer failure.
- One project focuses on feasibility of total solid state LTC and static phase shifters.
- Final reports are being drafted for both projects.

SRL:sf:BERGERON

cc: Stig Nilsson
Olin Compton