8.12 POWER TRANSFORMERS – TOM LUNDQUIST, CHAIRMAN

The Power Transformers Subcommittee met on Wednesday, March 22nd, 2006 with 54 members and 44 guests.

The minutes from the Memphis, TN meeting were approved with no changes or corrections.

The chairman asked if anyone was aware of any patent conflicts, none were voiced.

8.12.1 WORKING GROUP AND TASK FORCE REPORTS

8.12.1.1 TASK FORCE FOR REVISION OF C57.17, REQUIREMENTS FOR ARC FURNACE TRANSFORMERS – Dominic Corsi, Chairman

The Task Force on revision of C57.17, Arc Furnace Transformers, was called to order at 8:00 am on Monday, March 20, 2006. There were 10 attendees.

The minutes from the Memphis meeting were approved.

A copy of PC57.17/D1 was distributed to those in attendance.

Task Force member Mr. Laszlo Kadar gave an excellent presentation on the "Application of Electric Arc Furnace Transformers". Topics covered in his presentation included:

- Types of Arc Furnace Applications: direct arc, smelting, melting, etc.;
- Typical ratings;
- Common operating stresses;
- Life expectancies; and
- Trends in ratings.

Dom Corsi reviewed the "Instructions for the WG Chair" as pertaining to "Patents and Inappropriate Topics for Discussion".

- The opportunity was provided for the WG members to identify or disclose patents that the WG member believes may be essential for the use of that standard.
- There were no responses given that specifically referenced patents and patent applications that were involved in the WG activities.

Dom Corsi briefly reviewed important changes in the following Sections:

- Section 4, "Ratings"
- Section 6 "Impedance Voltage"
- Appendix A, "IEEE Guide for the Interpretation of Gases Generated in Electric Arc Furnace Oil-Immersed Transformers".

The Task Force members were asked to carefully review these changes and to comment on the same.

With no other new business proposed from the members, the meeting was adjourned at 9:15am.

8.12.1.2 WORKING GROUP FOR DEVELOPMENT OF PC57.143, GUIDE FOR APPLICATION OF MONITORING TO LIQUID IMMERSED TRANSFORMERS AND COMPONENTS- Donald Chu and Andre Lux, Co-Chairmen

Meeting Minutes for Working Group on PC57.143 Transformer monitoring. 8:00 AM March 20, 2006 Costa Mesa, CA

- 113 members and guests were in attendance.
- Patent issue was mentioned with no one presenting an issue.
- Review of work completed since the fall meeting:
    - Conversion of attendance tracking and email correspondence to the AM system. Members were notified that they will not receive any correspondence unless they are properly registered in the AM system.
    - Conversion of the document to comply with IEEE standards formatting.
- Review of issues resolved during the meeting:
    - Deleted several sections from Monitoring System section and redefined the scope of remaining headings in this section.
    - Assigned the task of condensing the Benefits section to Brian Sparling and Donald Chu.
    - Resolved to maintain the annex sections but only after the content is condensed further.
    - Recruited several volunteers to resolve the remaining tasks.
    - A small session will be held during the Boston Doble conference to further address the remaining tasks.
- Tasks remaining:
    - Instrument Transformer Monitoring section needs to be written. We are soliciting volunteers from the C57.13.5 WG.
    - Condense the Annex sections. We have volunteers for this task.
    - Convert the condensed annex sections to the new format.
- Remaining tasks from the fall meeting:
    - Cross check definitions in document with IEEE standard definitions: C57.12.80.
    - Check C37.10 standard for duplication of scope and eliminate those sections which overlap scope already covered in another standard.
    - Move all remaining technology specific details to an Annex including:
        - DGA Technologies/Monitoring Methods
        - Partial Discharge Technologies/Monitoring Methods
- The meeting adjourned at 9:15.

8.12.1.3 WORKING GROUP FOR DEVELOPMENT OF PC57.148, STANDARD FOR CONTROL CABINETS FOR TRANSFORMERS – Joe Watson, Chairman

The Working Group for PC57.148 met on Monday from 11:00 to 12:15 with 15 members and 15 guests. 3 of the guests were added to the membership.

Work continues on Draft #4. Draft #4 was issued last year, but had not been posted on the website but Sue McNelly took care of this during the meeting. She also posted two sets of drawings that have been prepared by ABB for two OA/FA type designs, one with and one without a LTC.

The WG decided that standard control cabinet drawings should be available for 6 different types of transformers:

- OA (ONAN) w/LTC
- OA (ONAN) w/o LTC
- OA/FA/(FA) (ONAF) w/LTC
- OA/FA/(FA) (ONAF) w/o LTC
- FOA (OFAF or ODAF) w/LTC
- FOA (OFAF or ODAF) w/o LTC

A small group was assembled to review the drawings before proceeding with the next 4 designs. The intent is to have these drawings posted by IEEE and available for downloading by users. We are still working out the details with IEEE.

The schedule calls for the group to review these drawings and agree on the standard design within 2 months after the meeting. The remaining drawings can be prepared by the next meeting when the entire document with text and drawings can be reviewed. With agreement on the complete document, we should be ready for balloting by the end of this year.

8.12.1.4 WORKING GROUP FOR DEVELOPMENT OF PC57.131, STANDARD REQUIREMENTS FOR TAP CHANGERS - William Henning, Chairman

The Working Group on LTC Performance met on Monday, March 20, 2006 with 14 members and 36 guests.

The working group chairman asked if anyone had information on any patents that may be related to the work of this working group. It was noted that no one present at the meeting expressed knowledge of patents related to our work.

Next, the minutes of the previous meeting in Memphis were approved as written.

A table was distributed that summarized the results of a recent Power Transformers Subcommittee straw vote on the draft revision of C57.131, "Requirements for Tap Changers." Twenty four comments were submitted in the straw vote. The WG took action on each of the comments and will revise its draft accordingly. We will respond to each participant who responded to the straw vote by sending them a copy of the table showing all comments received and the observations of the working group on each comment submitted.

The following specific action items are required to bring this draft to a ballot:

1. We need to bring in all the figures for the main body and annexes into the IEEE template.

2. We will contact the IEEE standards staff to see if they have the "source documents," especially for the figures; otherwise we will have to redraw them all.

3. We need to edit the draft with all the changes and additions that resulted from the 24 comments received in the straw vote.

4. We can then submit the draft to IEEE for formation of a balloting group and the ballot.

With that, the WG business for this meeting on the tap changer standard, C57.131 was completed.

A topic outline for the Tap Changer Application Guide had been prepared for discussion, but because the time was 3:00 pm, we were out of time and needed to adjourn.

8.12.1.5 WORKING GROUP FOR DEVELOPMENT OF PC57.140, GUIDE FOR THE EVALUATION AND RECONDITIONING OF LIQUID IMMERSED POWER TRANSFORMERS - Rowland James, Chairman.

The Working Group for the development of PC57.140 held a brief meeting at 3:15pm on March 20, 2006 to report on the status of the Guide, which is as follows:

Draft 17 of the Guide was balloted in October of 2005. We received an overwhelming approval, with just a handful of negative votes.

In October, 2005, the CoChairmen formed a Ballot Resolution Group from among the members of the Working Group.

The eight-member ballot resolution group has reviewed all the comments submitted (both affirmative and negative) and formulated a response for each.

Draft #18 has also been created.

Our next step is to correspond with each Negative Balloter, to explain our response and ask for a change in their ballot.

With that complete, we will submit Draft 18 for a Recirculation Ballot, in the next month or so

In December 2005, we also received a one-year extension on the PAR for PC57.140, in order to complete our work.

We adjourned at approximately 3:45pm

8.12.1.6 IEEE C57.120-1991, IEEE LOSS EVALUATION GUIDE FOR POWER TRANSFORMERS AND REACTORS REAFFIRMATION REPORT - Michael Lau

Meeting minutes were received, will be included ASAP.

8.12.1.6.1 WORKING GROUP FOR DEVELOPMENT OF PC57.150, GUIDE FOR THE TRANSPORTATION OF TRANSFORMERS AND REACTORS RATED 10,000 KVA OR LARGER –Greg Anderson, Chairman

The Working Group for Transportation Issues Guide, PC57.150, met at 9:30 am, Wednesday, March 22, 2006.

There were 15 members present with 18 guests and 9 guests requesting membership in the WG. Those requesting membership were:

Michael Busch
Don Chu
David Goodwin
Jim Graham
C. J. Kalra
Rick Ladroga
Mike Lamb
Dennis Marlow
Bob Tillman

Agenda:

1. Introductions

2. Patent Issues
3. Approval of Fall 2005 Minutes
4. Submittals

   Submittals have been received from:
   - Dave Wallach
   - Craig Swinderman
   - Jane Verner
   - FPM
   - Kipp Yule

5. Sections needing assignment

The IEEE Patent disclosure requirements were discussed and a request was made for disclosure of any patents that may be related to the work of the WG. There were no responses to the request for disclosure.

Approval of minutes from the October 25, 2005 meeting was requested. The minutes were approved with note that Jane Verner's name was misspelled.

Reviewed the submittal from Dave Wallach for shipping specifications that his company uses. There were lengthy discussions regarding shipment in dry air versus Nitrogen and on impact recorders. Consensus was that dry air should be used and the use of nitrogen discouraged. Tom Lundquist volunteered to take on writing a paragraph on the dry air/nitrogen issue.

Reviewed definitions provided by Craig Swinderman. Craig provide numerous definitions

Reviewed Jane Verner's submittal on impact recorders and suggested maximum values for impacts. Discussed actual numbers and that note should be included that impact at lower values may damage the transformer as well. These are numbers where a person needs to think about that there may be resultant damage. Should require an internal inspection at a minimum if these values are exceeded. Suggested electrical tests should also be included but the manufacturer should be consulted in all cases prior to doing any inspection and testing. Greg requested a volunteer to help modify the section. Jane offered to modify what she had submitted based on the discussion comments. Les Recksiedler will help Jane. Joe Watson mentioned that there was a paper written by SMIT on low frequency oscillations on ocean shipments. He will look into getting this paper.

Greg noted that he got some information on transportation issues with rough handling from a contact in Mexico as well

Greg acknowledged that he had also just received Kip Yules' submittal on Marine shipping.

A comment was made that we may need to note that there may be port entry and inspections required. Tom Lundquist will look into this and provide some input. Some of this may be covered in the Incoterms.

Comment on shipping with or without oil may provide different issues and should be considered for inclusion in the guide.

Assignments:

1. **RFQ, Specification**

   Transportation relevant data:

	Assignment
UCC vs Incoterms (see Installation Guide)	Ewald Schweiger
Exact address, contacts, status of site (existing, under construction)	Users requested to send in spec requirements

2. **Design**

	Assignment
Vertical / Longitudinal / Lateral direction	It was determined that we should not try to tell the Manuf how to design the transformer.
We may want to have some minimal requirement that the unit needs to be designed for truck or rail shipment regardless of how it is initially shipped. This should be noted on the nameplate Should also make a comment that different locals, countries, and shipping providers take different care of transformer shipments. Add some criteria on bracing. Ron Barker will provide some wording on this.	

3. Shipping preparation (XFMR – Main Tank)

	Assignment
Gas Filling - Dry air supply, # of bottles; Pressure; Regulator	Bill Darovny

4. Shipping preparation (Accessories)

Crates / Boxes / Containers

	Assignment
Special requirements	Tom Lundquist will resend info he supplied previously
Material legal compliance (treatment of lumber, etc)	Open
Refer to §5.1 Paper "Heavy Hauling, transportation and Rigging Guidelines for PT" - TF for Truck Rigging&Crane	Open

5. Shipping

	Assignment
Forwarder – Selecting subcontractors, checklist	Open
Barge and ocean vessels - Age of equipment, Registration, Lashing	Phil Sherman, Kipp Yule, Dave Kirshner
Others - Airplanes	Open
Oil	Open

6. Arrival (Receipt) Inspection

	Assignment
Electrical Tests - FRA (specify tests - transformer oil filled y/n, before after testing, with or without bushings)	Jane Ann Verner and Jerry Murphy
Mechanical Tests - Ratio, Winding resistance, dielectric Power Factor, Insulation Resistance, No load excitation at 60Hz and 110% rated voltage, Induced voltage test, and DGA	Jane Ann Verner and Jerry Murphy

In general, good progress is continuing to be made on the document. A draft will be sent out in the next several weeks for review.

Meeting was adjourned at 10:55 am.

8.12.1.7 WORKING GROUP FOR THE REVISION OF C57.93, INSTALLATION OF LIQUID-FILLED TRANSFORMERS - Michael Lau, Chairman

The Working Group for Guide on Installation and Maintenance of Liquid-filled Transformers met at 01:45 PM on Tuesday March 21st, 2006. There were 45 attendees, 19 members, and 26 guests. After introductions, minutes from the October 15, 2005 meeting in Memphis Tennessee, were reviewed and approved without comment.

1) IEEE patent policy was reviewed and the group was asked if there were any disclosures. There were none.

2) The Chairman provided a brief summary of activities conducted over the last year:
- A straw vote was conducted among the Power Transformer Subcommittee members with mostly editorial and some technical comments.
- Draft #9 was submitted to IEEE for editorial review.
- Two PAR revision requested have been submitted to IEEE.
One request was to change the Title of the Guide
From: "Guide on Installation of Liquid Immersed Power Transformer ",
To; "Guide on Installation and Maintenance of Liquid Immersed Power Transformers".
The other request is for time extension as the PAR is due to expires at the end of 2006.
- The contents of the Annex, Figures and Tables were reviewed by Ewald Schweiger, Jane Verner and Paulette Payne Powell and changes have been incorporated in Draft #12.

3) An issue has been brought up by Nguyen Van Nhi regarding the requirement of "soaking time" (i.e. time after unit is energized but before load is applied) for newly oil-filled transformers. He also pointed out that it would be desirable to obtain oil sample for DGA analysis during the "soak time" for future reference and possible diagnoses. After much discussion, the group agreed that such a soak time requirement be added to the Guide.

4) A question was raised regarding taking oil samples from the conservator tank. The concern is bad oil from the conservator tank could contaminate the main tank oil. Two utilities indicated they do take samples from the conservator.

5) The chairman indicated the document should be ready for open balloting in the near future.

There is no other business. The meeting adjourned at 02:45pm.

8.12.1.8 TASK FORCE FOR FUNCTIONAL LIFE TESTS OF DE-ENERGIZED TAP CHANGERS – Phil Hopkinson, Chairman

The Task Force on Life Tests, De-energized Tap Changers was called to order at 9:30 AM on March 21, 2006. There were 43 attendees, 21 members, 1 requesting membership and 21 guests. Reviewed the agenda for the meeting, and the IEEE patent policy. The Minutes from the October 25, 2005, meeting in Memphis, Tennessee were approved.

1. Mission – Develop Functional Life Test and Supporting Technical Paper for De-energized Tap-changers

2. Reports from Reinhausen, Central Moloney on test results

Dr. Kramer reported on testing conducted by Reinhausen. Reinhausen is concerned that 130 C oil may prove to be a fire hazard, and have proposed 110 C instead. They also believe that the test time at 110 C oil and 3 times rated current for 16 hours on and 8 hours off daily will need to be extended from 30 days to 150 days. An update on progress will be presented at the October meeting. Presentation to be posted on the website.

Darren Barnett reported on testing conducted by Central Moloney. Darren indicated that he had been measuring resistance of 2 contacts in series instead of each contact alone. Hopkinson indicated that the series measurement masks the precision of resistance change and should not be done. Darren indicated that he will change to the more precise measurement technique where the voltage probes are placed close to each contact in the future. Presentation to be posted on the website.

The meeting adjourned at 10:36 AM.

8.12.1.9 WORKING GROUP FOR REVISION OF C57.135, GUIDE FOR THE APPLICATION, SPECIFICATION AND TESTING OF PHASE-SHIFTING TRANSFORMERS – Jim McIver, Chairman

The meeting was held on Tuesday Mar. 21st at 11:00 am. After the usual introduction and display of IEEE's Patent policy, the minutes of the previous meeting were approved as written.

Joe Cheung has replaced Joe Watson as secretary.

- 7 members, 5 guests were in attendance.
- Focus of the WG remains editorial revisions & clean-up of the original figures
    - Present guide posted on TC website for revision suggestions.
    - TF members will be meeting electronically to reformat & revise Section 4 figures.
    - To date, few comments received requesting editorial revisions. McIver & Lundquist will solicit additional comments from Pwr Transformer Sub-committee.
- PAR to officially initiate the revision process will be submitted by the chair during the week of March 24.
- The revised guide will have dual Logo status with IEC. The SA staff assures that the new dual logo revision process is well established.
- The meeting was adjourned at 11:30 AM.

8.12.1.10 WORKING GROUP FOR REVISION OF C57.12.10, STANDARD REQUIREMENTS FOR LIQUID IMMERSED POWER TRANSFORMERS - Javier Arteaga, Chairman

No meeting minutes received from Javier Arteaga.

8.12.1.11 IEEE STD 638-1992, IEEE STANDARD FOR QUALIFICATION OF CLASS 1E TRANSFORMERS FOR NUCLEAR POWER GENERATING STATIONS REAFFIRMATION – Craig Swinderman, Chairman

Date: Tuesday, March 21, 2006 – 3:15 pm to 4:30 pm.

Attendees: 4 members + 4 guests

This was the initial meeting of the Working Group. The existing standard IEEE 638 is now up for reaffirmation, but has received some negative comments during the balloting, including both technical and editorial aspects. As such, this new working group was formed to work on revising the existing standard. The existing document covers transformers rated 601V up to 15,000 V for the high voltage winding, and up to 2,500 kVA self-cooled rating transformers for Class 1E applications.

There were discussions on whether to take the opportunity when revising the existing standard to have the scope of the document expanded to cover a wider range of transformers, such as wind turbine transformers.

Fortunately, a few of the attendees in the meeting were from the Nuclear Power Generation industry and familiar with the existing standard. It was pointed out that "Class 1E" is a specific requirement in the Nuclear industry for a special class of electrical equipment involved with powering the systems that safely shut down a nuclear reactor in the case of an emergency. It is for this reason that there is demanding qualification requirements placed on this type of equipment. This also ties in with the requirements of IEEE 323, which describe requirements for qualification of all types of electrical equipment used for "Class 1E" applications.

It was suggested that IEEE 323 be reviewed, and that possibly a liaison from IEEE 323 working group be invited to attend our working group for IEEE 638 to make sure the revisions are in agreement with IEEE 323.

It was also recommended to consult with various people from the Nuclear Power industry to get an opinion for how a widening of the scope of IEEE 638 would be perceived and voted on by that industry.

After this investigation, we will determine if the scope of the IEEE 638 document should be expanded to cover other transformer applications or if the scope should be kept to its present limit.

An additional topic of discussion was the Annex A contained in the existing IEEE 638-1992 document. Annex A is used to demonstrate the thermal ageing of the transformer insulation materials. It was discussed that members from the Loading Guide working group or Insulation Life subcommittee should be consulted to see if Annex A is up-to-date and still applicable.

Once the scope of the IEEE 638 revision has been determined, we will issue a request for a PAR to revise the existing document.

The meeting adjourned at 4:30 pm.

8.12.1.12 TASK FORCE, TRANSFORMER TANK RUPTURE AND MITIGATION – Peter Zhao, Chairman

The chair opened the meeting at 11:00AM, and welcomed the members and guests. There were 54 attendees in total which included 8 members and 46 guests. 13 guests requested the membership to the TF.

IEEE patent policy was addressed and no patent conflicts were reported.

This is a general review and presentation session – Transformer Rupture and Mitigation.

After Memphis meeting, the members were starting to work on the task as a team with communication through phone conferences and e-mail, and the following were accomplished;

- Scope of work, review subjects were identified and confirmed.
- Review groups/pairs were formed.
- Presentation reports (8) were prepared, which cover the areas:
  - Transformer Rupture Statistics
  - Mitigation Techniques (5 reports)
  - Present Std Coverage to the Subjects
  - One Utility's Practice in Specifying the Tank Requirements

During the meeting, only 6 of 8 presentations were made due to the time restriction, and the balance will be presented in 2006 Fall Meeting.

During the Question period, the following were discussed:

- A survey to the Users related to the tank requirements and specifications was suggested to be performed.

- One more review subject – nitrogen blanked transformer was added.
- Additional brand of less flammable fluids will be reviewed.

The TF will help users to better understand the tank rupture and mitigation techniques available on the market, and therefore properly address their needs.

8.12.1.13 C57.116 Reaffirmation Report – Tim Raymond

8.12.2 OLD BUSINESS

None.

8.12.3 NEW BUSINESS

It was stressed that Working Group and Task Force Chairs must inform all presenters that product specific names, trade names or commercial names must not be allowed in their presentation material. Generic names should be used.